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PULMONARY TUBERCULOSIS IN RECRUITS

EXPERIENCES IN A SURVEY BY THE MICRORADIOGRAPHIC METHOD

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Radiological surveys as an indication of the incidence of pulmonary tuberculosis have in the past been limited by the expense of *x*-ray examinations. Fluoroscopy and paper films have been used in an attempt to reduce this cost. The value of fluoroscopy is limited in that the examination by a radiologist takes an appreciable time, exposure to *x* rays makes the method dangerous, there is no permanent record, and the results even with modern plants and screens leave much to be desired. However, at least one large insurance company in New York has found screening of such value that a fluoroscopic examination of the chest is a routine before acceptance of a proposal. While paper films are less costly than the usual *x*-ray film, they are still relatively expensive. Paper film must be recently prepared and kept in cold storage if good results are to be obtained (Douglas, 1939).

Photography of the fluorescent screen image was attempted in the early days of radiology, notably by Bleyer in 1896. Numerous experiments were carried out, especially in relation to cineradiography (de Abreu, 1939). With advances in output of the *x*-ray plants, and particularly with improvement in the quality of *x*-ray screens, fluorography has become a practical procedure (Dormer and Collender, 1939). Manuel de Abreu in Rio de Janeiro was responsible for many of the advances in technique (Lindberg, 1939), and in 1936 the first plant taking records on small photographic film was used in Brazil (de Abreu and Lindberg, 1939). By the beginning of 1939 twenty-five microradiographic plants were working in that country.

Since the discovery of cadets with active pulmonary tuberculosis at the Royal Military College in 1938 the medical directorate at Australian Army Headquarters has considered the possibilities of mass survey of recruits. On December 7, 1939, financial authority was received for the *x*-ray examination of the 6th Division, Second A.I.F. The first *x*-ray plant was delivered on December 23, 1939, and over 22,000 men were examined by March 1. Details of the equipment used, the procedure adopted for taking the radiographs, and an analysis of the results of this survey will be found in appendices to this paper.

The object of the survey was to detect those recruits who were suffering from active pulmonary tuberculosis. Transmission of infectious disease occurs readily in the Army because of the close contacts of men sleeping in hutments and tents (Radmilo, 1939). The removal of as many as possible of the sources of tuberculous infection would, it was hoped, reduce the incidence of pulmonary tuberculosis in the Australian Imperial Force. During 1939 pensions and medical treatment of tuberculous ex-soldiers of the First A.I.F. (1914–18) cost approximately half a million pounds. The exclusion of only some of the infective tuberculous cases from the Second A.I.F. will almost certainly help to reduce the repatriation cost of the present war. Among the first 22,000 men of the A.I.F. 109 cases of active pulmonary tuberculosis were detected.

The normal procedure of enlistment includes a preliminary medical examination at the recruiting depot. This is followed by medical examination by a board of two medical officers at the recruit reception depot. Radiological examination takes place at this depot before the recruit is transferred to the training camp. Each recruit is informed that the first recruit medical examination is preliminary only, and that he is not to give up his usual employment until he has been examined by a medical board and his chest has been radiographed. Between 5% and 10% of men passed fit by the recruit medical examination are rejected by the medical board. Approximately 0.5% of the selected group of men passed as fit by the medical boards are found to have active tuberculosis after *x*-ray examination.

The Method

Every small film is examined by at least one physician and one radiologist. Usually more than two medical men are present during the viewing of films, and if anything suspicious is seen the opinion given is that of the whole group. Whenever anything abnormal is detected in the 35-mm. film a large radiograph is taken next day. No man is rejected on the small film alone. The 14 by 17 inch film is reported upon by a physician and a radiologist, and the large film, with the report, is made available to a medical board consisting of two physicians. No man is discharged from the Forces upon *x*-ray findings alone: in every instance in which radiological examination suggests tuberculosis a case history is recorded and the recruit's chest is re-examined by two physicians. If any sputum can be obtained it is examined for tubercle bacilli by staining and culture. In Victoria every man with a tuberculous lesion detected by *x*-ray examination is referred to Dr. R. Webster, who passes a small stomach tube and collects the fasting-stomach contents. These are cultured for tubercle bacilli. These bacteriological examinations have disclosed an extremely high proportion of positive results. The majority of cases of active tuberculosis detected by *x*-ray examination can be regarded as disseminating infection.

When the medical unfitness of the recruit is confirmed his discharge is effected and he is referred to the appropriate local State Health Authority for treatment and supervision. The *x*-ray report, the 35-mm. film, and the 14 by 17 inch film are filed with the recruit's medical papers in Base Records. A central referee medical board

consisting of specialists in diseases of the chest will decide whether there are grounds for compensation in any particular case.

The number of recruits examined from the Second A.I.F. (6th Division and reinforcements) up to March 1 was 22,000. Of this total 109 (0.5%) films were classified by radiologists and physicians as active pulmonary tuberculosis. In addition, 88 cases were classified as fibrosis, calcification, etc., in which the radiological appearances were not definitely those of a healed or quiescent lesion. The majority of these latter deferred cases were passed as medically fit by subsequent medical boards. Of the above 22,000 films about 9,000 were personally examined by me, and the remainder of this paper deals with the conclusions drawn from these 9,000 films.

It takes some time to become accustomed to reading the small films. Both the intensity of illumination and the character of the surface upon which the films are projected make an appreciable difference. Each radiologist has an optimal distance from the projection screen at which the image appears most like the large chest films to which he is accustomed. If one approaches too close to the screen the chest appears blurred. Some abnormalities are detected more easily at a distance of 8 to 12 feet from the projection screen, but for routine reporting a distance of 6 feet suits most of those who have seen a large number of these small films. The small films can be projected up to a size of approximately 12 by 14 inches without loss of detail. Enlargement to the usual 14 by 17 inch size to which we are accustomed in the examination of chests is not always possible.

The maximum number of 35-mm. films reported upon by a group was about 1,000 in an evening of three hours. As fatigue occurs rapidly the practice was adopted of one radiologist reporting upon not more than 70 to 100 successive chests without relief by one of the others present.

A comparison between the 35-mm. pictures and the 14 by 17 inch film demonstrates that there are factors operating in the microradiographic technique which result in variations from what is generally regarded as a normal chest radiograph. Owing to the reduced tube–screen distance and longer exposure the heart outline is blurred and relatively large. More lung tissue is seen above the clavicles, and pleural scars and apical calcifications show up more readily, in the small film than in the 14 by 17 inch film of the same individual. Vascular markings in the infraclavicular areas of the chest appear more obvious in the small films. During the examination of the first thousand 35-mm. films a large number of 14 by 17 inch films were ordered under the impression that these shadows represented fibrosis or infiltration. After subsequent comparisons with the large films it was clear that the shadows in the 35-mm. films were of vascular markings within the limits of normality. Fewer 14 by 17 inch films were needed in the later stages of the survey. Basal thickenings seemed more common than was expected, but as attention was centred on a search for pulmonary tuberculosis the presence of heavy vascular markings at the bases of the lungs was not always confirmed by large films. The outline of a lung cavity was often more clearly seen and areas of consolidation sometimes appeared larger in the 35-mm. picture than in the 14 by 17 inch film.

Difficulty was encountered in deciding whether nodules were calcified, fibrotic, or soft in outline. It might well be said that the decision should be left to the medical boards examining the recruit in addition to seeing his films. However, as the large majority of recruits in whom pulmonary tuberculosis was detected had few, if any, clinical signs of disease, a radiological opinion as to the quiescence or activity of a lesion must influence a subsequent medical board. The function of microradiography is merely to reduce the number of large *x*-ray films to be taken, and therefore the decision as to activity rests upon the interpretation of the 14 by 17 inch film rather than that of the 35-mm. film. The activity of a tuberculous lesion can rarely be determined upon a small film alone.

Shadows thrown by ribs and transverse processes of the vertebrae gave rise to more difficulties than are usual with large films. In the small films the outline of the descending aorta is seen more clearly behind the heart, and the vertebral bodies can often be observed through the heart shadow. Soft-tissue shadows, particularly those thrown by the pectoral and the sternocleidomastoid muscles, caused arguments.

Survey of Results

In addition to the discovery of 49 cases of pulmonary tuberculosis many other lesions were detected in the men examined. In 9,000 chests there was one large cyst at the right base, two mediastinal neoplasms, and several aneurysms of the aorta. Two recruits with congenital polycystic disease of the lung were discovered, as well as one large solitary air-containing cyst occupying a third of the right chest. The diagnosis of non-tuberculous pneumonitis was made in several recruits. In one man an area in both the large and small films was reported by the group of radiologists as tuberculous, and the recruit was found medically unfit by a subsequent board. Two weeks later an *x*-ray examination showed the chest was clear. In all there were eight films in which consolidation at the base or middle zone of the lungs suggested bronchopneumonia or were labelled "pneumonitis."

The cardiac outline was regarded as abnormal in many films; several reports that the heart shadow suggested mitral or aortic valvulitis were confirmed by subsequent clinical examination. One heart was reported upon as the type found in congenital pulmonary stenosis, and examination agreed with this diagnosis. Dextrocardia was recorded twice only in 9,000 chests. Gross cardiac enlargement with pulmonary congestion was recorded in two cases. The aortic shadow was reported as abnormal in shape and density in many films, and these men were re-examined. The age recorded at the time of enlistment was often found to be false, and in a few instances abnormal blood pressures were discovered.

Pulmonary Tuberculosis

Examination of the *x*-ray films and medical records of the 49 cases of pulmonary tuberculosis demonstrates the limitations inherent in the usual methods of clinical examination of the chest. While admitting all the difficulties of hurried examination in a noisy drill hall at the time of the recruit medical examination, and taking full account of the disabilities under which the medical boards worked in the camps, it is still rather disconcerting when *x*-ray examination discovers large areas of consolidation and extensive cavitation. Still more disturbing is the fact that even when the medical boards were aware of the area of lung involved no physical signs could be detected in many of the men examined. It is customary to teach students that they are not to rely on the *x*-ray film for diagnosis, yet here we have discovered over 30 cases of tuberculosis, many with sputum or stomach contents containing tubercle bacilli, in which there are neither clinical symptoms nor physical signs of disease.

The medical records of the cases examined after a diagnosis of tuberculosis had been made by the radiologist reveal a few interesting facts. Many of the men found to have pulmonary tuberculosis were under weight

at the time of enlistment, and practically every one of the men lost weight during his period of training under camp conditions. It is usual for healthy recruits to lose weight during the first week or so in camp, but the weight rapidly returns and almost invariably exceeds the pre-enlistment level within six weeks of entering camp. If a man continues to lose weight after the first two or three weeks he probably has some physical or psychological abnormality.

The following cases are quoted as illustrating the value of routine radiography.

One man serving in a medical unit was passed as "Fit, Class I," at two medical examinations. *X*-ray examination showed extensive chronic tuberculosis with large cavities in both lungs. The sputum contained tubercle bacilli. On being challenged he admitted that he had been under treatment for tuberculosis for the past three years.

Examination of the medical records of another recruit showed he had signed a form stating that he had never had "pleurisy" or "spitting of blood." At two medical examinations he was passed "Fit, Class I." *X*-ray examination revealed extensive areas of infiltration with fluffy outline in the left upper lobe and numerous calcified areas in the upper half of the right lung. A subsequent medical board obtained a history of recurrent pleurisy for the past four years and of cough with blood-stained sputum for one year. The only physical signs detected were a slight hollowing beneath the left clavicle with diminution of intensity of breath sounds. His sputum contained acid-fast bacilli.

A lesion at the left apex was detected by *x*-ray examination of a recruit in whom no physical signs were discovered at three different medical examinations. The radiological evidence was so definite, however, that the final medical board classified him as unfit. After his discharge from the Forces this man admitted that he had been coughing up blood for three weeks, although he had informed the medical officers on three separate occasions that he had no symptoms and had signed two forms stating that he had never suffered from "spitting of blood."

Nine thousand chest films were personally examined and forty-nine of these were classified as showing "active tuberculosis." Definite cavities were seen in fifteen films, the incidence of cavitation being 30% of the 49 cases of tuberculosis, or 0.17% of the total chests examined. Some of the cavities were quite large, and in some instances cavities were present in both lung fields. Tubercle bacilli have so far been discovered in the sputum or stomach contents collected from 5 of the 15 men in whom *x*-ray examination revealed cavitation. No physical signs could be detected in 6 of this group of 15, even when the area of the chest involved was known to the examining physicians. In addition to the above 15 recruits with cavitation, 34 chest films showed opacities which were classified as tuberculous parenchymatous lesions of the lung field. Medical boards have subsequently confirmed the diagnosis of active pulmonary tuberculosis in all but one of this group. Direct questioning of the recruits making up the group often disclosed a history of cough, sputum, haemoptysis, or pleural pain.

Besides the above 49 recruits with tuberculous consolidation and cavity there were 22 in whom radiological examination of the chest showed definite lung fibrosis. Thirteen of these were clearly old quiescent lesions, but in 9 there was some doubt as to the degree of activity.

Forty-three of the 9,000 chests examined showed areas of calcification in the lung field that suggested old healed tuberculous infection of the so-called "adult" type. In 14 out of these 43 cases the radiologists referred the recruit to a medical board as the *x*-ray appearances were not definitely those of quiescent tuberculosis.

In the total of 9,000 chests examined there was evidence of "secondary" "adult" type pulmonary tuberculosis in 120 cases, the incidence of tuberculous infection thus amounting to 1.33% in a selected group of adults. Of this total 49 were regarded as showing radiological evidence of active pulmonary tuberculosis, and 29 had sufficient radiological evidence of activity to justify further examination by a board of two physicians. Of these 29 deferred cases few were regarded by the subsequent medical boards as showing clinical signs of active pulmonary tuberculosis. Thus in a total of 9,000 men examined by microradiography the incidence of active pulmonary tuberculosis was 0.55%.

The Future

The *x*-ray examination of recruits in Australia is now to be extended to the Permanent Military Forces and the Garrison Battalions. The Royal Australian Air Force has adopted a similar routine procedure. Every member of the Forces will be re-radiographed on his return from abroad. This record will be obtained even if the soldier has not had symptoms of chest disease while on service. A comparison of these post-war films with those taken on enlistment will not only form a basis for a clinical investigation but may make the task of pension authorities a little less arduous.

Extension of routine radiography of the chest to the civilian population is the next step. The removal of a large proportion of the infective members of the tuberculous population can be confidently expected. A mass survey of the whole population is a practical proposition using the modern method of microradiography (Potter, 1940).

This paper must close upon a note of caution. There has been much criticism of the microradiographic method of diagnosis of tuberculosis. An ancient Chinese proverb states that "a gem cannot be polished without friction, nor a method perfected without adversity." It is not the opposition which is to be feared in the future of microradiography; a greater danger is that of the too ardent advocate.

Enthusiasm for a relatively cheap method of detection of tuberculosis must not be allowed to outstrip caution. With our present technique microradiography can only be regarded as an adjunct to radiography by the well-tried methods of large *x*-ray films. No one should be labelled tuberculous on the unsupported evidence of a 35-mm. film.

This paper is the result of the work of many willing helpers. To the radiologists, the physicians, and *x*-ray technicians who assisted one can only say that the survey would not have been possible without their loyal co-operation. To Dr. Cecil Eddy, who in addition to preparing Appendix I gave invaluable assistance in the early stages; to Captain E. R. Crisp, who wrote Appendix II and was responsible for the organization of much of the survey; and to Drs. H. Wunderly and J. O'Sullivan, my thanks are particularly due for assistance freely given.

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APPENDIX I

Equipment for Miniature Radiography

The equipment chosen comprised a high-tension unit by Stanford *X*-Ray Pty. Ltd. delivering 100 mA at 85 kV and 60 mA at 100 kV, connected by shock-proof cables to a shock-proof 10-kV Eureka self-protected *x*-ray tube. The tube was mounted on a counterweighted tube stand, the central ray being directed to the centre of the fluorescent screen. The camera unit, also mounted on a counterweighted rigid stand, consisted of a light-tight pyramid-

shaped metal box 30 inches long, closed at the base with a 17 by 13 inch Levy West fluorescent screen. At the other end was fitted a Leica camera, with an F/1.5 lens and auxiliary front lens to permit focusing at 30 inches. The camera was mounted with the lens protruding through a brass plate half an inch thick, which prevented fogging of the spooled film; no evidence was obtained of *x* rays having penetrated the lens system. The tube and camera unit were connected by an interlocking bar, fixing the focal screen distance of 3 feet; adjustment of the screen to the patient's height automatically adjusted the tube height. All direct radiographs required as a result of the inspection of the miniature radiographs were taken with the same *x*-ray tube and a vertical casette holder.

The camera was provided with a special fitting to hold the shutter open immediately each exposure on the film was wound on, 36-exposure film in daylight-loading spools being used. The exposure was controlled by the *x*-ray timer: there is evidence that a certain amount of "afterglow" in the screen augments the photographic image without causing any difficulty with the next exposure.

With screen photography higher voltages than are possible with direct radiography can be used without producing over-penetration. Using a focal screen distance of 3 feet, 85 kV, 100 mA, a photograph of satisfactory density can be obtained of an average-sized chest with an exposure of approximately 0.2 second. (During the survey, difficulties experienced with electrical supply conditions made it necessary to increase the exposure time for men with large chests.) Although Ilford H.P.2 film was used at first, it was found that the grain size of the faster Kodak Super XX (32 Scheiner) introduced no difficulties. It is necessary to use a fine-grain developer and to develop out as far as possible.

APPENDIX II

Procedure Employed for Miniature Radiography of Chests of Recruits in Camp

Recruits from the units are paraded at times arranged: (i) in single file, graded in height; (ii) stripped to the waist, without hats and with clothes left in the ranks (carrying any articles of clothing definitely slows the procedure); (iii) pay-books in hand. Space is essential to permit a steady forward movement and to provide ventilation—a necessity when dealing with 1,500 daily. *X*-ray record sheets were prepared beforehand containing columns for (1) Spool No.; (2) Serial No.; (3) Name and Initials; (4) Regimental No.; (5) Rank; (6) Unit; (7) Remarks. The last-mentioned was used for the reports on the small films. A sheet corresponds with one spool, and so has thirty-six spaces on it.

Each man presents his pay-book, and one orderly reads out required facts to a clerk. The recruit is given a small ticket bearing a number corresponding to his serial number on the sheet, and his pay-book is stamped. The ticket-books are made with every thirty-sixth page in red. The red ticket is handed out in turn and is marked "End of Spool No. —," the number being the spool on the sheet just finished. The red ticket signifies "end of spool" to the staff in the second room, and its number is a check on the next spool number to be placed on the camera unit.

The man proceeds to the *x*-ray room, where his progress is regulated by another orderly, who also checks the ticket numbers and makes sure the men are in their correct order. The recruit then passes before two orderlies seated at a table, where are prepared strip metallic figures on adhesive strapping, the numbers corresponding with the serial number on the record sheets and in addition the recruit's regimental number. A technician takes the man's ticket, checks it against the prepared number, and if correct the adhesive number and the man are ready to follow on to the camera unit.

Each man is told to watch the man in front and do what he does; it is arranged that he has the opportunity of seeing three people radiographed before being done himself. Each man is placed in position by a sergeant-technician, and an exposure made with the chest in full inspiration. As the recruit leaves the hut an N.C.O. from his unit marks a nominal roll. The adhesive numbers are placed on the top left-hand corner of the screen unit, the spool number in the right-hand corner. The camera unit and tube are adjusted to the height of each man—a movement greatly facilitated by accurate grading and height. After each exposure the camera film is moved on and the shutter reopened by the special attachment.

The importance of adequate protection of personnel must be stressed, for the scattered radiation is very great when doing large series of men in a short time. Heavy lead screens are used, and the staff have blood examinations at frequent intervals.

APPENDIX III

Recruits examined by microradiography	9,000
No. of 14 by 17 inch films ordered	541 (6%)
No. of microradiographs showing evidence of hilar calcification suggestive of a healed primary tuberculous infection	4,830 (54%)
No. of films showing evidence in lung fields of past or present tuberculous infection of the secondary adult type of tuberculosis	120 (1.33%)
No. of recruits showing radiological evidence of active pulmonary tuberculosis	49 (0.55%)
No. of recruits showing fibrotic or calcified areas in lung fields in which the radiological appearances, while suggestive of a quiescent lesion, were not definitely those of a non-active tuberculous lesion	29 (0.3%)
No. of men showing fibrotic or calcified areas in the lung fields suggesting a healed or quiescent lesion	43 (0.47%)
No. of films showing cavities in the lung fields	15 (0.17%)
No. of recruits in whom radiological examination suggested tuberculosis of the lungs, and of whom subsequent examination of the sputum and stomach contents showed tubercle bacilli in smear or culture	16 (0.18%)

SERUM AND PLASMA IN TREATMENT OF HAEMORRHAGE IN EXPERIMENTAL ANIMALS

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The stability of serum or plasma, and the growing body of evidence that pooled samples of them can be safely used in human patients of any blood type, prompted us to reinvestigate the extent to which these fluids could replace whole blood in the treatment of animals suffering from acute haemorrhage.

Although Rous and Wilson (1918) had stressed the importance of the fluid in contrast to the cellular elements in the treatment of haemorrhage, whole-blood transfusions have until recently been considered the only satisfactory treatment for blood loss. Bond and Wright (1938), however, reported the successful use of "lyophilized" serum in the treatment of haemorrhage in experimental animals, but the conditions of these trials were not described in detail. Since we began our experiments Levinson, Neuwelt, and Necheles (1940) and Strumia, Wagner, and Monaghan (1940) have published interesting papers bearing on this subject. Strumia and his co-workers report the successful treatment, with relatively small doses of plasma, of patients suffering from surgical shock and haemorrhage. Levinson *et al.* adopted the experimental method of Blalock (Johnson and Blalock, 1931) and subjected dogs to repeated bleedings. The efficacy of the replacement therapy was gauged by the time of survival of the animals. These

workers found that isotonic serum was an excellent substitute for whole blood in the treatment of acute haemorrhage. It is interesting in this connexion that they were able to remove in successive small bleedings some 40% more fluid than the amount represented by the animal's original blood volume. This was made possible by the substitution of an equivalent amount of isotonic serum after each bleeding. Both groups stress the need for rapid restoration of blood volume after haemorrhage. Levinson (1940) has recently applied his experimental findings in the clinic, and has reported several cases of massive acute haemorrhage which were treated effectively by the administration of isotonic human serum.

There are many difficulties in appraising the results of the treatment of acute haemorrhage, since the amount of blood which must be removed before recovery without treatment fails to take place varies widely from animal to animal. For this reason we have studied animals that have been reduced by bleeding to a state in which recovery without treatment was certain not to occur. Our results serve to emphasize again the usefulness of serum or plasma and the predominant part played, under the conditions of these experiments, by the fluid and the protein components, in contrast to the oxygen-carrying elements of the blood, the treatment of haemorrhage.

Methods

This study deals with results obtained in some 55 dogs, which varied in weight from 5 to 16 kg. Anaesthesia was usually produced by injections of pentobarbital sodium, but ether was occasionally used. The animals were prepared in the usual way for the recording of blood pressure and the administration of fluids. After the blood pressure had reached a reasonably steady level and control blood samples had been obtained, bleeding was begun through an arterial cannula at a rate which produced a gradual reduction of the pressure to about 30 mm. Hg. It soon became apparent that neither the weight of the animal nor its initial blood pressure afforded any precise indication of the quantity of blood which had to be removed before typical post-haemorrhagic shock appeared. When enough blood was removed, however, this condition usually developed (Table I). It was characterized by a low body temperature and a failure of the blood pressure to rise above the level of 30 to 50 mm. Hg after cessation of bleeding. When death was imminent treatment consisting of the application of heat and the intravenous injection of serum or plasma was instituted.

Determinations of blood volumes were made by the dye method of Gibson and Evans (1937) as adapted to the photo-electric colorimeter (Gibson and Evelyn, 1938), but after many control experiments it became apparent that samples taken more than thirty minutes after the injection of the dye (T 1824) gave unreliable results when the animal was in post-haemorrhagic shock. For this reason satisfactory blood-volume determinations were secured in only eleven experiments. Cell volumes were determined by the haematocrit.

Results

In Table I the findings in 18 cases of untreated haemorrhage are summarized. The weight of the animal, its initial blood pressure, and the haematocrit value give no useful indication of the volume of blood which must be removed to produce shock. In these experiments, however, no animal losing more than 55% of its calculated blood volume recovered without some form of treatment. In only 3 cases out of 12 was there a significant decrease in the cell volume as determined by the haematocrit. Blood-volume determinations were made on 7 animals of this series. In those cases in which the bleeding was continued until shock developed the blood volume was never reduced by more than 30%, although in many instances 60% of the calculated initial blood volume had been removed. The results of these studies suggest that blood pressure is the best index of the condition of an animal suffering from loss of blood.

In the treatment of post-haemorrhagic shock an attempt was made to compare the efficacy of various blood substitutes. In each experiment the animal was bled until, on the basis of previous experience (Table I), we believed early death to be inevitable unless effective treatment was instituted. Isotonic saline, hypertonic saline, and glucose solutions were tested. Even when administered in large quantities these solutions produced rises in blood pressure which were so evanescent that they were considered to have relatively little value as blood substitutes under the conditions of our experiments.

In Table II the results of treating 10 animals in post-haemorrhagic shock with their own heparinized blood are summarized. About 40% of the blood removed had to be replaced to secure recovery of an animal in well-established post-haemorrhagic shock. The accompanying chart shows the result of treatment with isotonic serum,

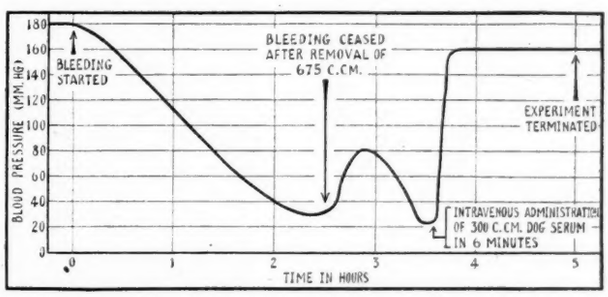

Chart showing results of isotonic serum treatment of post-haemorrhagic shock in a dog (11.6 kg.).

and Table III gives details of 9 experiments in which this blood substitute was used. As in the case of whole blood, a volume of serum equivalent to approximately 40% of the volume of blood removed had to be administered to obtain permanent benefit. There is no need to differentiate here between serum and plasma. In theory and in our experience they are therapeutically identical.

Concentrated blood serum has a certain therapeutic value in the treatment of traumatic shock in dogs (Best and Solandt, 1940). In post-haemorrhagic shock, where large quantities of fluid have been lost from the body, we would not expect concentrated serum to be more efficacious than an equal volume of isotonic serum. In 4 experiments we found this to be true.

With all effective blood substitutes the best results were obtained by the rapid administration (50 to 100 c.cm./min.) of the whole volume to be given. If the blood pressure could be raised to over 100 mm. Hg in this manner without the use of specific vasoconstrictor drugs a good end-result was assured. It was also apparent, as others have previously observed, that the longer the period between the onset of shock and the initiation of treatment the less effective was the treatment.

In all the work thus far described a satisfactory therapeutic result was represented by a return of the blood pressure to within normal limits and its maintenance there over a period of several hours. Table IV gives a summary of experiments in which post-haemorrhagic shock was induced in 5 animals and in which observations were continued for more prolonged periods after treatment. One animal returned to consciousness but refused to take fluids, and died twenty-four hours after treatment.

TABLE I.—*Production of Post-haemorrhagic Shock in Dogs*

Weight of Dog	Initial Haematocrit Value	Percentage of Calculated Initial Blood Volume Removed	Duration of Bleeding	Blood Pressure at End of Bleeding	Haematocrit Value at End of Bleeding	Haematocrit Value Just Before Death	Results
Kg.			Min.	mm. Hg			
10.0	44	67	150	45	32	25	Death 120 min. after bleeding stopped
6.0	37	68	30	20	33	29	" " " " " "
5.0	54	29	30	25	50	54	" 35 " " " "
6.4	55	62	140	40	48	49	" 30 " " " "
6.4	48	76	120	22	45	47	" " " " " "
12.0	46	54	120	20	41	41	" " " " " "
10.4	—	75	150	25	—	—	" 15 " " " "
10.4	50	37	12	20	—	—	Almost immediate death from haemorrhage
4.5	45	37	10	20	28	—	" " " " "
5.0	—	44	20	20	—	—	" " " " "
5.0	41	55	60	32	40	—	" " " " "
10.4	—	62	90	30	—	—	" " " " "
9.2	47	41	20	20	41	47	Blood pressure 90, sustained
10.4	50	31	1	15	50	52	Complete recovery
12.0	49	55	10	10	53	56	" "
5.4	46	53	70	55	48	48	Blood pressure 90, sustained
6.0	56	18	20	25	—	—	Complete recovery
6.8	44	42	35	45	—	—	" "

TABLE II.—*Treatment of Post-haemorrhagic Shock with Whole Blood*

Weight of Dog	Initial Haematocrit Value	Percentage of Calculated Initial Blood Volume Removed	Duration of Bleeding	Blood Pressure at End of Bleeding	Haematocrit Value at End of Bleeding	Blood Pressure Beginning Treatment	Amount of Blood Given	Final Haemato-crit Value	Results
Kg.			Min.	mm. Hg		mm. Hg	c.cm.		
9.2	66	45	90	30	60	30, falling	200	—	B.P. 140, sustained
9.2	37	24	60	38	38	30, "	100	34	" 125, "
9.2	—	48	40	40	—	25, "	200	—	" 120, "
12.8	50	63	120	40	—	23, "	360	—	" 120, "
13.6	48	58	60	45	—	40, "	300	—	" 158, "
13.2	40	53	180	30	40	27, "	160	46	" 130 "
8.2	42	50	80	30	47	24, "	100	52	" 75, fall to shock level in 50 min.
6.0	39	46	20	35	35	25, "	100	37	" 120, decline to 70 in 180 min.
11.6	43	74	180	32	36	30, "	200	37	" 80, fall to death in 30 min.
16.4	56	60	160	38	36	18, "	300	35	Practically no response ; death in 15 min.

TABLE III.—*Treatment of Post-haemorrhagic Shock with Isotonic Serum*

Weight of Dog	Initial Haematocrit Value	Percentage of Calcu-lated Initial Blood Volume Removed	Duration of Bleeding	Blood Pressure at End of Bleeding	Haematocrit Value at End of Bleeding	Blood Pressure Beginning Treatment	Amount of Serum Given	Final Haemato-crit Value	Results
Kg.			min.	mm. Hg		mm. Hg	c.cm.		
12.4	41	53	120	40	41	20, falling	425	—	B.P. 115, sustained
11.6	60	62	120	30	58	26, "	350	33	" 150, "
11.6	50	64	150	38	41	24, "	300	27	" 160, "
8.0	42	50	60	32	40	25, "	100	23	" 100, "
13.2	—	58	65	22	—	18, "	375	—	" 135, "
8.4	45	56	120	32	—	20, "	225	25	" 165, "
9.0	48	55	90	40	45	43, "	300	—	" 135, died 24 hours later. Nemb.
8.0	53	77	150	30	42	25, "	140	23	" 70, decline to death in 60 min.
6.8	52	64	75	23	49	20, "	120	26	" 72, decline to death in 90 min.

TABLE IV.—*Treatment of Post-haemorrhagic Shock with Isotonic Serum in Survival Experiments*

Weight of Dog	Percentage of Calculated Blood Volume Removed	Blood Pressure			Amount of Serum Given	Results
		Initial	At End of Bleeding	After Treatment		
Kg.		mm. Hg	mm. Hg	mm. Hg.	c.cm.	
9.0	55	165	43, falling	145	300	Slow initial recovery. Died 24 hours later
9.2	50	190	32, "	150	300	Uneventful recovery. Killed 3 days later
11.0	70	165	25, "	140	400	Uneventful initial recovery, but died of tracheitis 18 hours later
6.8	50	125	25, "	110	150	Uneventful recovery. Killed 2 days later
11.2	46	180	25, "	160	280	Uneventful recovery. Killed 3 days later

Another animal died from a purulent tracheitis. The 3 remaining animals made a complete and uneventful recovery.

Summary and Conclusions

In the treatment of post-haemorrhagic shock, such as we have produced in experimental animals, approximately 40% of the blood removed must be restored to secure recovery. Comparable volumes of serum or plasma produce equally satisfactory results. These findings indicate: (1) that *under these conditions* the volume of the red cells restored to the animal is more important than their oxygen-carrying capacity ; and (2) that serum and plasma, which can be stored for long periods, are effective blood substitutes for the treatment of haemorrhage. Our results indicate the importance of administering blood or blood substitutes at a rapid rate (50 to 100 c.cm./min.) and, of course, as soon as possible after the haemorrhage.

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EXPERIENCE IN THE TREATMENT OF WAR BURNS

BY

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The flash of the exploding bomb and the fires started by incendiary bombs make burns one of the most important of air raid casualty injuries. After the evacuation from Dunkirk a large number of cases of such burns were transported to the hospital to which I am attached. Many lessons were gathered, but one lesson stood out clearly from it all—the necessity for and the value of a prepared routine of treatment.

With numerous other casualties requiring treatment much of the after-care of these cases must be left to the nursing staff, and it is essential, first of all, that instructions to them be clear and definite. In the majority of cases both hands are burnt and the eyes are closed. The demands on the nursing staff are consequently heavy; therefore it is a mistake to fill a ward with burn cases only. On the other hand, the cases should not be distributed to more than three or four wards. It is then easier for the surgeon and medical officer, the amount of stained linen is much reduced, and a few sisters are enabled to become experts in treating burn cases. In the midst of patients recovering from other injuries, who talk to them and help them with their comforts, convalescence too is brightened.

In view of the damage to the skin, there has been a tendency to feel that skin specialists should regard these cases as coming within their domain. "Burn clinics" under their care have even been formed. But these cases require a great experience of sepsis, of deformities, of ill patients, of blood transfusions, and a knowledge of skin grafting. The responsibility for them should be in the hands of a surgeon, who, though he will not be able to attend personally to all, must yet guide the treatment. The aid of other specialists must, however, be freely invoked. Thus one of the ophthalmologists of this sector saw the eyes in every burn case, and a standard routine method of treatment was mapped out. A dermatologist, too, was invited to see the cases, and he was able to give much help in treatment. It is often the custom to relegate these cases to the most junior house-surgeons. The swollen face and eyes, the mask of the tan, make it not easy to judge the clinical condition of a case of burns—and here the value of the physician cannot be overstressed. At this hospital these cases came under the care of the physicians. They are able to guide as to the general condition of the patient and give much assistance in the problems of septicaemia, nephritis, and chest complications—though these were but occasional in this series. I would urge that in wartime physicians be responsible for cases of burns—under the guidance of the surgeon and with his co-operation.

General Treatment

The soldier is of course a "fit" patient and he will as a rule withstand more than the civilian. Of the patients admitted from Dunkirk some had been almost five days and five nights without sleep. After constant bombing and machine-gunning from the air, shell fire on the sands, and immersion in the sea they were exhausted. Sleep and rest were as important as operation. With prolonged air attacks at night these conditions can well be repeated in this country. As a routine, therefore, morphine was immediately given in large doses—and it should be stressed that a third of a grain is usually required. Some of the men admitted had been given far too small doses. Following morphine, 1/3 grain of omnopon was "boarded" as a routine in every case; this was to be given if the patient was in pain—and the nursing staff had it impressed upon them that it was not a feat or a credit to have withheld this. Many of the men had been lying on the sands at Dunkirk after their burns, and as they all did so well it has been suggested that the immersion in the sea-water had probably been the best cleanser. Be that as it may, a large number had not been immersed, and they too did well. With such conditions it can well be appreciated that some of the men were very ill on admission—and it is difficult to judge how ill a burn case is, especially by the light of a small torch. Blood-pressure readings are suggested as a routine, but nearly all these patients have their forearms and hands burnt and oedematous, and it is agony for them to have the blood pressure taken. Frequent haemoglobin readings are recommended; but with a large number of casualties, and darkened wards, it is impossible, however desirable, to carry this out. Clinical signs alone had to serve as a guide to the condition of the patient, and of these the pulse was always the most reliable. The ill patient lies still, moving not a limb—cold in body and, despite the morphine, groaning in a weak voice. In two cases 500 c.cm. of plasma—as recommended by Wilson (1940)—was given; they recovered, but the number is too small to prove anything. For those patients who were cold the hot electric cradles usually recommended were not available, but hot-water bottles in large numbers sufficed. The old-fashioned remedy of 6 oz. of hot strong coffee per rectum proved most satisfactory in warming up these patients. With burnt faces and lips any hot drinks were resented.

Local Treatment

As an immediate application tannic acid, eitther in solution or as a jelly, is unquestionably the method of choice. Several men had been burnt in tanks three to five days before admission. All tanks carry first-aid tannic jelly outfits—and hands filled with grease and oil had daubed the jelly all over. These cases did well: not only was the area coagulated but their general condition was so satisfactory because any further loss of serum had been sealed off by the tan. This should be the routine treatment. Many of the cases transported here had had picric acid or acriflavine and paraffin applied at the first-aid stations.

Every patient was cleaned in the theatre as soon as his condition permitted; and, with fluids by mouth and rectum only, and plasma in two cases, this was possible. Many surgeons are reluctant to clean burns admitted late; but in our experience the general condition in no way deteriorated with this cleaning, nor did it precipitate severe sepsis or septicaemia. All these patients had received their burns at least twenty-four hours before admission, the majority three to four days previously. No case was "too late" for full treatment in the theatre. The burns were chiefly confined to the face and scalp, the forearms and hands; and in the more ill patients the skin of the chest or abdomen was burnt. In some the entire skin over these regions was charred, but in the majority the total thickness of skin was not involved, and they may therefore be classed as the "superficial" or second and third degree burns.

Anaesthesia.—Nearly all these men had burnt faces. Intravenous anaesthetics such as evipan and pentothal spared the patient the unpleasantness and difficulties of induction. A vein in the arm or the leg was always available. This type of anaesthesia has been condemned as too "depressing" for such cases. In no instance,

however, was there any trouble, and it was made a rule that the maximum dose of evipan was to be 10 c.cm. (1 gramme). It was necessary to continue with gas and oxygen in most cases, and the mask was applied over several layers of sterile gauze. The intratracheal tube is of course ideal; but its use calls for some dexterity and experience, and the expert anaesthetist was usually fully occupied with the severer casualties. With the large number of burns to be dealt with, all available operating tables had to be utilized, and the anaesthetics had therefore to be divided among the remaining staff. The expert anaesthetist may well serve best by supervising a number of cases.

The Cleaning.—With arms and face all burnt, the work may be expedited by a nurse or a second doctor cleaning at the same time as the surgeon and under his supervision. Much has been written on the need for gentleness in these cases, and it has been recommended that only saline be used. Nearly all these patients, however, have grimy oily hands, on which the saline makes no impression. Weak ether soap and water was utilized in all these cases. The soap is smooth, and washing—not scrubbing—will merely remove the debris and add nothing to the damage. Many of these patients were still covered with the fuel oil of the sunken ships: with ether soap this readily came off. The region surrounding the burn is the important area, for from that will come the infection. In all face and forehead burns the hair was therefore shaved well back under the anaesthetic. No scrubbing-brush was used and the surrounding skin was washed and prepared as if for operation. While the burnt area itself is being cleaned it is well to ask the assistant to picture the battered frail underlying cells that guard a surface, apparently smooth, but jagged and irregular as the "fjords of the coastline of Norway"—as Mr. Ogilvie has so picturesquely described it. The debris, the dead skin, and all the overlying blisters are removed, and it is common for dead dirty nails to come off in the process. Attempts are often made unnecessarily to leave these, and they form a potent source of infection.

The Silver-nitrate-Tannic-acid Method.—With a large number of burns the slower methods of coagulation cannot be applied. To spray every fifteen minutes or to be continually applying more solution disturbs the patient at the time when he needs most rest, and when the nursing staff will already have been worked to the limit. An immediate tan is undoubtedly a great advantage, and this method was used throughout and proved most satisfactory. After cleaning with ether soap the surface was washed with saline, and the surrounding area, spirited, rapidly dried. The solutions—5% tannic acid in water and 10% silver nitrate—are kept separate and are dabbed on to the cleaned areas by separate gauze swabs. The black tan which immediately forms rapidly dries. The silver nitrate solution keeps, but the tannic solutions are preferably freshly prepared. On the face a little petroleum jelly is first applied to the eyelids, and if two pieces of wool are held firmly over them there is no danger of the solution running into the eyes. The crust is not the thick crust of stronger tannic-acid solutions, and therefore moulds itself more readily to the changing contours in the regions of the joints. It has been urged that there is some danger of a tannic-acid crust causing gangrene of the fingers—and for this reason methyl-violet has apparently found favour. In the only case in our series in which the tips of some fingers sloughed the gangrene was primarily due to the burn and was anticipated at the time of the primary treatment. The scorched dark brown epidermis is often not recognized as indicating severe deep damage. A series of patients admitted at the same time who had been treated with methyl-violet had a very much more prolonged and unsatisfactory convalescence.

Splintage.—It is characteristic of burns that a marked local oedema develops within a few hours. Not only does this increase the discomfort of the patient but its persistence will lead to "glueing," especially of the finger-joints, and convalescence will be delayed. As a routine the burnt forearm and hands were therefore placed on broad straight padded Cramer wire splints, with a pad of wool for the palm and pieces of gauze between the fingers. They were then wrapped in gauze and bandaged to the splint. In bed the raising of the splinted arms on sloping pillows greatly assisted in the rapid reduction and drainage of the oedema. This maintains the wound at rest; it is so often forgotten that burns are wounds and must be treated as such. The patient's hands or face must not be allowed to roll in the blankets or sheets, for that is a most potent cause of sepsis in these cases. The face and neck should not be bandaged at all, but sterile towels should be placed under the head and the chin. It must be stressed that the splints must be lightly applied, and that their purpose is in no way connected with the prevention of contractures.

Brilliant-green.—The burnt areas are usually infected from the adjacent skin, and the streptococcus is the commonest type of invader. Brilliant-green is particularly effective in treatment of infection, and in our cases the edges of the tan were painted daily. More frequent painting causes no damage when there is a tendency to moistness. We used 1% brilliant-green in 30% alcohol as recommended by Henry. This is of special importance in burns of the scalp, forehead, and neck. In all the cases except two it was possible to keep the scabs in these regions absolutely dry.

The Eyes.—The eyes require much care. With small pieces of sterile wool dipped in 1% solution of sodium bicarbonate the excessive secretion is wiped away several times a day and a few drops of sterile liquid paraffin (parolein) inserted. The eyes are kept unbandaged, and if there is any marked redness the nursing staff is instructed to wash them out. It is amazing how the eyes escaped injury in all these explosive burns. Only one patient developed a small corneal ulcer.

Chemotherapy: Diet

Chemotherapy was employed as a routine, with a standard dosage. An initial dose of three tablets of sulphanilamide was followed by two tablets every four hours for forty-eight hours and then one tablet four-hourly for another forty-eight hours—a total of 19.5 grammes. By this method inadvertent overdosage is avoided. Sulphapyridine was not used in these cases because it is our experience that despite glucose and sodium bicarbonate there is a tendency to nausea or vomiting. As it is important for these patients to take ample fluids, even mere nausea is obviously a disadvantage. No dose of sulphanilamide is omitted even at night—and this has to be stressed, for some of the patients under morphine may well sleep twelve hours on end and thus miss three doses. With this sulphanilamide dosage there were no complications.

Only one patient developed a leucopenia: his white cell count fell to 2,250 (polymorphs 22%, lymphocytes 70%). In his case there were also an extensive laceration of the scalp and bilateral fractured calcanei. Because of continued swinging pyrexia, without obvious pocketing of pus, his house-physician placed him on a course of sulphapyridine. The course began one week after the sulphanilamide therapy ended, and he was given 22 grammes in a period of seven days. With cessation of the drug and the use of pentnucleotides the white cell

count rose within forty-eight hours to 4,450 (polymorphs 40%, lymphocytes 52%). This patient is also of interest as he was the only one in this series who passed blood and albumin in the urine—in the sixth week. There was no pain, no oedema, no casts, no hypertension. Haematuria has been described after sulphapyridine therapy, but the administration of that drug had ceased three weeks previously.

With the large number of cases now having chemotherapy at the same time a standard dosage in each hospital is most desirable.

Diet is undoubtedly important. Much protein has been lost via the serum, and a higher protein diet is therefore advisable. Milk supplies protein in the most abundant manner, and the patients are therefore encouraged to drink large quantities. Vitamins play an important part in the repair of tissues, and although synthetic vitamins may be used the natural food vehicle is always the best. Each patient was therefore ordered a full fruit ration, and, as ample oranges were available, four fresh oranges and two lemons daily in the form of drinks, extra fresh tomato juice, and their full share of butter.

The above instructions are best summarized by giving each burns ward a slip worded as follows:

BURNS CASES

1. *Hourly pulse for 24 hours.*
2. *Fluid chart. Urinary output.*
3. *Push the fluids*, especially milk. The patient requires a high protein diet. Include four oranges and two lemons in his daily drink.
4. Remember, *burns are open wounds* and require the same asepsis. The discharge of pus is not an indication of tan failure —it is inevitable with granulations. Frequent dressings serve no purpose and are harmful.
5. Keep the affected limbs elevated. Encourage the active movements of all other joints.
6. *Treat the Eyes.*—Excess pus is wiped away several times a day with sterile cotton-wool in 1% sodium bicarbonate solution. A few drops of parolein are then inserted. The eyes are not washed out unless they are very red.
7. *Sulphanilamide Therapy.*—Tabs. iii stat. Then 2 tablets 4-hourly for 48 hours ; then 1 tablet 4-hourly for another 48 hours. No dose is to be omitted even at night. This dosage is not to be further continued without the medical officer's instructions.
8. *A spirit of encouragement*, and assurance, will do much to ease the convalescence.

Later Treatment

Dressings.—The limbs are maintained splinted for seven days, when the scabs will have begun to lift and it will be essential to start movements of the fingers. Healthy joints, we know, as Watson Jones especially has stressed, may be immobilized for a considerable time and a full range of joint function expected. But with fingers, unless early movement is re-started the return of full function is much delayed. The explanation can be found in the fact that clothing all other joints there are muscles, which despite immobilization continue to massage, and maintain the circulation in, the lymphatics. In the fingers there are no muscles, and unless tendon movements are retained the lymph stagnates and becomes organized round the joints. Within a week, if healing has been maintained, the hands and fingers therefore come out of their splints, a sterile dressing is lightly bandaged on over the tan, and active movements are started. There is no danger of the tan being damaged by active movements, for hands that can bend iron will not bend a straw if this causes pain.

Deeper Burns.—The lifting of the tan need not bring disappointment. If the burn has been deeper granulation tissue is inevitable and there will be pus under the tan. But this is no indication for its removal. No further dressing was done in these cases until the fourteenth day, when the tan, if already lifted, was removed. Gauze with vaseline was then applied and left for a further fortnight. Several cases were re-tanned, but if the burn is deep this again lifts, and no great advantage was obtained. Small areas between the fingers and at the corners of the ears, the tip of the nose, or the dorsum of the hand are occasionally unhealed when the crusts lift. Every sister has a pet ointment, but in our experience none of many proprietary preparations showed any advantage over the simple petroleum jelly dressing. It is important to impress upon the patient that dressings are being deliberately avoided, otherwise he is apt to feel neglected.

Contractures.—For deep burns it cannot be too strongly emphasized that to prevent scarring contractures skin-grafting at the earliest possible moment after the sloughs have separated is advisable. *Tight splints will not prevent contractures* ; often they favour it. As the damaged tissue is maintained on the stretch it lays down more and more scar tissue, which will always contract. A skin graft alone will prevent formation of scar tissue. However severe the burns no cock-up splints or correcting plaster slabs were employed. Nothing is to be gained by the daily dressing of these burns with eusol and suchlike antiseptics. Nature will do her own separation far more proficiently and adequately. Only a simple dressing of petroleum jelly was used.

Plaster-of-Paris.—The same principles of healing apply to burns as to other wounds, and the importance of immobilization of the affected part is recognized by all. The use of plaster for the limbs therefore commends itself ; but the extensive oedema so characteristic of burns which develops within a few hours obviously limits its employment. In the Dunkirk casualties the oedema was already established, and the few patients upon whom plaster was tried were very uncomfortable. In two associated forearm fractures a close-fitting plaster was applied over petroleum jelly, but in forty-eight hours the oedema had subsided and the plasters were loose shells.

In the *later treatment of the deeper severe burn cases*, however, plaster proved of great value. At the end of a fortnight the oedema had subsided, and the use of plaster then began. In this series it was employed in seven extensive burns of forearm and hand, and it had been effective in lower-limb cases too. Over a vaseline dressing and one layer of sterile plaster wool—the vulnerability of burns to any pressure is well known—the forearms and hands were encased in plaster. The improvement was immediate: the patients all felt comfortable, and by the simple addition of a pen encased in or strapped to the plaster they were able to turn over the pages of their books. The plasters were changed at fortnightly intervals. At the end of six weeks two of the limbs were found to be healed. Four others were skin-grafted, and it was found that the Thiersch grafts " took " even if applied immediately after removal of the pus-soaked plaster. No preliminary " cleaning up " for several days with saline compresses, as is often done, was necessary. In one case, where the initial burn was so severe as to have destroyed the tips of the fingers, it was already possible to Thiersch-graft the greater part of the hands and forearm.

Results

Seventy cases of burns were admitted. Of these 37 were treated in the theatre by the silver-nitrate–tannic-acid method ; the rest had been cleaned up and treated before admission by either methyl-violet or tannic-acid solutions. There were no deaths in the silver-nitrate–tannic-acid series. There were, however, two deaths in the other—one patient died immediately on admission and one died four days later. The former case had been cleaned, treated with tannic acid, and immediately transferred to this hospital. In our experience, with the use of chemotherapy the later cleaning of such a burn—that is, after transportation—does not add to the risk. The other case

had been partially cleaned and treated with methyl-violet, and the patient died four days after admission.

The average healing time with the silver-nitrate–tannic-acid method was three and a half weeks, and the aesthetic appearance of such scars was particularly gratifying. At the seventh week the recently grafted cases alone had not yet regained full movements of the fingers.

Summary

The principles of the treatment of burns, with special reference to the Dunkirk cases, are discussed.

The importance of a prepared scheme of treatment, especially in war, is stressed.

The silver-nitrate–tannic-acid method is strongly recommended.

The use of plaster for the later treatment of deep burns is advocated.

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ABDOMINAL ACTINOMYCOSIS TREATED WITH SULPHAPYRIDINE

BY

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The poor prognosis in abdominal actinomycosis is sufficient justification for reporting the recovery of a case with diffuse infection after treatment with sulphapyridine.

Clinical History of Case

The patient, a girl aged 22 in the A.T.S., was curetted for dysmenorrhoea on November 13, 1939. She recovered without incident from this operation, but on November 17 she complained of abdominal pain and her temperature rose to 104°. On November 20 a laparotomy was performed through a small right paramedian incision and a drainage tube was inserted. On November 25 pus appeared for the first time, and thereafter continued to flow round the tube in increasing quantities. She lost weight and strength and complained of constant abdominal pain. On two occasions she was transfused.

I saw her first on December 19, a pale emaciated girl dreading every contact. Light creamy pus was pouring round the tube in the abdominal incision; it did not appear to be coming from the abdominal cavity, but from pockets in the abdominal wall that extended over the whole lower part and into both labia, upwards round the umbilicus, and over the epigastrium as far as the costal margin and outwards into the right flank. So far as could be felt by palpation through this infected abdominal wall there were no masses in the abdomen, and respiratory movements were reasonably good. Rectal examination suggested a plastic peritonitis binding the pelvic viscera together but did not disclose any lump or localized abscess. It was clear that the incision was merely a vent through which the overflow from a large undrained reservoir of pus was escaping in quite inadequate quantities. The wide extension of this pus in the subcutaneous planes of the abdominal wall, and its appearance, suggested that the case was an example of the undermining ulcer described by Frank Meleney (1936), which is due to a micro-anaerobic streptococcus and responds readily to free drainage and treatment with zinc peroxide. I asked that the girl might be transferred to London, where I had a supply of active zinc peroxide from the Dupont Company, kindly presented to me by Meleney when I was in New York. She was unfit to stand the journey of sixty miles, however, so I suggested that she should be transfused to bring her haemoglobin up to at least 70% and be sent in an ambulance as soon as her condition would admit it.

She arrived on December 29 very much as I had seen her, improved by the transfusion but debilitated by the reaction which had followed it and exhausted by the journey. I operated on January 1, 1940, laying open all the sinuses and packing them with vaseline gauze. The lower collection communicated with the extraperitoneal tissues of the pelvis through openings in each inguinal canal. The prolongation upwards led to a large cavity between the superficial fascia and the rectus sheath in the epigastrium; from this a track led through the abdominal wall under the right costal margin to the subdiaphragmatic space, apparently between the liver and the diaphragm, and a second track back into the perinephric tissues in the right loin. After this operation she was very collapsed, her haemoglobin dropping from 70% to 49%, and she was again transfused.

Scrapings from the granulation tissue showed polymorphonuclear infiltration and Gram-positive cocci. Stained films of the pus revealed a streptothrix, a Gram-positive coccus, and a Gram-negative bacillus. Cultures yielded *Streptothrix actinomyces*. She was given 180 grains of potassium iodide by mouth daily, which she tolerated well, and 90 grains of Blaud's pill daily with injections of anahaemin 2 c.cm. weekly. At first the free drainage of her sinuses produced a striking improvement. Weekly blood counts showed a steady rise in haemoglobin and red cells, with a drop in the white cell count from the first reading of 56,000 to about 20,000. The temperature remained at or just above normal. On the other hand, after an initial improvement from her cadaveric look, her appearance remained sickly, her pulse stayed at about 100, the discharge from the wound was as profuse as ever, and the granulations began to look less healthy. By the seventh week it appeared that in spite of maximum doses of potassium iodide she had ceased to improve and was losing ground, or at best was stabilized at a level from which recovery seemed unlikely.

Treatment with Sulphapyridine.—At this point Colonel Summerhayes of Newhaven, the medical officer to her unit, called my attention to the report by Miller and Fell (1939)

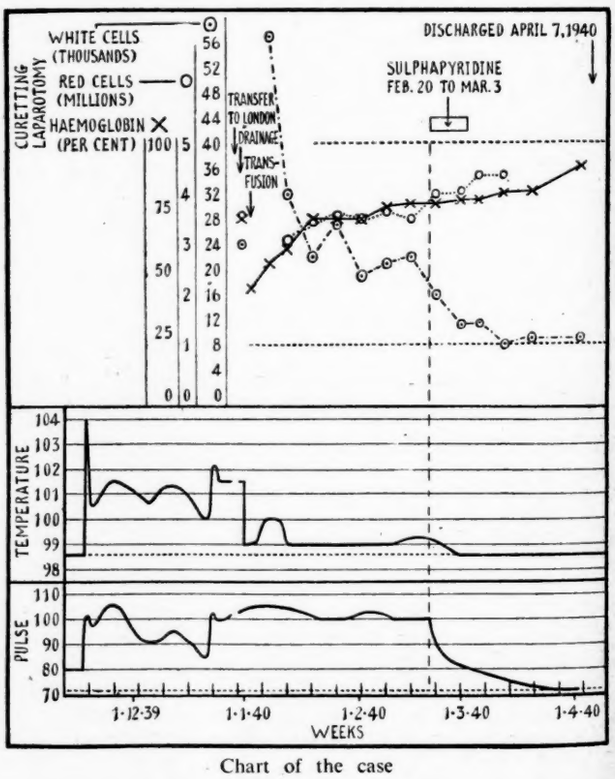

Chart of the case

of a case of abdominal actinomycosis treated with sulphanilamide. After consulting this paper and learning from it of Walker's (1938) successful case I felt that a trial of sulphapyridine was well worth while. The potassium iodide was discontinued on February 22, and on the 23rd the administration of sulphapyridine (M & B 693) was started. At first two tablets were given four-hourly, but since this led to

vomiting the dose was reduced after twenty-four hours to two tablets six-hourly. This course was continued till March 3—for thirteen days in all—by which time the change in her local and general condition was so dramatic that the drug was stopped. Estimations of blood sulphapyridine made every three days gave an average figure of free sulphapyridine 2.0 mg. per 100 c.cm., total 3.3 mg. per 100 c.cm., with minimum findings of 1.7 mg. and 2.4 mg. respectively. No methaemoglobin was detected. The discharge decreased rapidly from the first day of giving sulphapyridine. Drainage tubes were removed on February 27 and the wounds were healed by March 16. The patient left hospital on April 7, but was readmitted on May 14 for repair of a ventral hernia at the site of her original laparotomy and for appendicectomy. The appendix showed fibrosis, but no microscopical evidence of actinomycosis; as the pelvic viscera appeared to be normal, however, it seems likely that the appendix was the original site of the infection.

On July 12 the patient rejoined her unit with the A.T.S. Owing to the many scars in her abdominal wall she was not considered fit for motor driving, but is being employed in office duties. She has been advised to take 10 minims of Lugol's iodine thrice daily till the end of the year.

The salient features of the case are indicated in the accompanying chart. The drop in the pulse rate and leucocyte count is well shown, but the cessation of discharge, the gain in weight, and the rapid improvement in general condition do not lend themselves to graphic portrayal.

Conclusions

This case is not reported as a cure of actinomycosis by sulphapyridine. Before such a claim could be made it would be necessary to establish, by laboratory experiments with pure cultures, that the drug has in fact a lethal or inhibitory effect on the *Streptothrix actinomyces*. It is probable, as is the case with many anaerobic infections, notably those of gas gangrene, that in this patient the association of an aerobic haemolytic streptococcus with the causative organism had produced a more serious condition than a pure infection alone would have done, and that the sulphapyridine, by eliminating the streptococcus, allowed her to effect her own cure of the actinomycotic infection. Whatever be the therapeutic explanation, this girl, treated by standard methods, was losing ground and, if the estimate of the clinical course and the forecast of statistics can be accepted, would eventually have died; owing to sulphapyridine she is cured, or at any rate is well enough to be serving with the Forces.

I should like to express my thanks to Drs. R. Cruickshank and M. Hynes of the Group Laboratory of the North-Western Hospital for their constant help in the investigation and advice in the treatment of this case.

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The July issue of *Occupational Psychology*, published by the National Institute of Industrial Psychology (Aldwych House, W.C.2), contains an article by Mr. Eric Farmer, of the Industrial Health Research Board, on accident proneness and accident liability. After indicating the main factors determining accident incidence and the results of investigating accident proneness, Mr. Farmer deals with the prevention of accidents during wartime. "The necessity of increased production and the dilution of labour brought about by war conditions will greatly increase accident rate, unless special precautions are taken. . . . If the length of the working spell is unduly increased, hourly output is reduced and the accident, sickness, and absentee rate increased." He emphasizes the importance of training ordinary workers for unfamiliar tasks and the even greater need for adequate training for young and inexperienced workers.

EFFECT OF EXPLOSION-BLAST ON THE LUNGS

REPORT OF A CASE

BY

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The following case is reported because it illustrates the importance of blast injuries on the lungs.

Case Report

The patient, a man aged 30, was injured when a bomb of medium calibre fell into an enclosed space and exploded about forty-five feet away from him. He was admitted to hospital with a large lacerated wound on the outer side of the right thigh. The muscles were torn and the femur was exposed but not fractured. The wound bled freely, so that shortly after admission he had to be taken to the operating theatre. A general anaesthetic (ether by the open method) was given, and the wound was excised and the haemorrhage controlled. Soon after his return to the ward he was seen to be very much shocked, and a pint of plasma was transfused in three-quarters of an hour. He did not recover from the shock, but died twelve hours after sustaining his injury. Blood was not seen in the mouth at any time, and, in fact, symptoms suggesting a pulmonary lesion had not been noted.

A post-mortem examination was performed seven hours after death. The most striking changes were found in the lungs. They were as a whole not unduly congested. Many small fresh haemorrhages were visible on the pleural surfaces everywhere. The cut surfaces of the lung were most striking, since innumerable bright red points of haemorrhage were to be seen wherever a cut was made in either lung. The condition was unlike any I had ever met, and may perhaps best be described as a miliary condition of unmistakable fresh haemorrhages. No observation was made that the haemorrhages were more numerous in one part of the lungs than another; indeed, they seemed to be everywhere. The trachea and bronchi showed a number of submucous points of haemorrhage, and there was some blood on the surface of the mucous membranes. No tear was found in any part of the lungs, and no injury was discovered in the brain, kidneys, spleen, or any other viscus. Microscopical examination showed generalized arterial dilatation and intense focal capillary dilatation, with exudation of fluid into many alveoli. In a few places there were red blood cells in the alveoli and in the small bronchioles.

Discussion

The importance of these injuries needs no emphasizing. In the case described no clinical impression had been formed of the lung lesions present, yet consideration of these lesions suggests the necessity of being able to diagnose them if treatment is to be effective. It may, for example, be essential to postpone operation at all costs, apart from controlling very severe haemorrhage. Certainly if operation is necessary the form of anaesthesia chosen will be most important. Inhaled anaesthetics may be too irritating, and local anaesthesia would be preferable. If local anaesthesia were not feasible it might be combined with light gas-and-oxygen anaesthesia, or a basal anaesthetic might be preferred.

At present the diagnosis of damage to the lungs by explosion-blast can be made if blood-stained fluid appears in the nose or mouth without apparent cause, but further investigation of the whole problem is desirable. Experimental work now in progress has shown that in animals these injuries are due to the first impact of the pressure wave on the chest wall, and suggests that for every individual killed by blast many others may have pulmonary injuries. In addition to this experimental work

the three following lines of investigation are clearly indicated.

First, clinical observation of patients injured in an air raid should be instructive. It should be noted whether blood-stained fluid appears in the mouth, whether physical signs develop in the chest, whether the respiratory rate is increased, and whether the degree of shock appears consistent with the external injuries. These observations on a large number of patients, if carefully recorded, may make it possible to deduce in an individual patient that the condition described here is present or probably present. If, for example, as the result of careful observation of a number of patients it is proved that these pulmonary lesions are present in those whose degree of shock is out of proportion to the severity of the injury, then the indication will be to avoid operative intervention and open anaesthetics, and to concentrate on the treatment of shock by morphine, oxygen (preferably using the B.L.B. mask), and possibly transfusion of plasma. Still further observation will be required as to the effect of each of these points of treatment.

Secondly, reports of post-mortem examinations done as a routine on people killed in air raids, whether they had been admitted to hospital or not, would help greatly in assessing the frequency of the condition described.

Thirdly, radiological examination of the chests of patients who have been near a bomb explosion may show a miliary shadowing. No such shadowing was seen in either of two similar cases investigated recently. One was a patient who collapsed, became cyanosed, and had a weak pulse when she got up a week after her accident. These acute symptoms were probably due to a pulmonary embolus rather than to any lesion such as the one described here. The indication is to radiograph these patients as soon after the accident as possible.

The object of this communication is to stimulate interest in the subject and to indicate lines along which investigations might fruitfully be conducted.

Dr. S. Zuckerman of the Department of Human Anatomy, University Museum, Oxford, to whom the Ministry of Health has suggested that all observations on this subject should be forwarded, has kindly examined with me the lungs described here, and I am indebted to him for his description of the microscopical pathology. I should like to thank Mr. A. J. Blaxland, under whose care the patient was admitted, for permission to publish this case, and Dr. G. P. C. Claridge for much pathological assistance.

The Royal Victoria Hospital Tuberculosis Trust, which has existed for twenty-five years for the care and prevention of tuberculosis throughout Scotland, has issued its annual report. Much useful work has been done at the sanatorium colony at Liberton, where patients from all parts of Scotland have been received, and also in the direction of postgraduate courses in Edinburgh for members of the medical profession, the teaching of tuberculosis at the colony to medical students, and lectures to district nurses and nurses in training. Special mention is made of the substantial progress in the eradication of tuberculosis from attested herds of cattle since the introduction of the scheme in 1935. Since that year the number of attested herds in Scotland has increased from forty-four to 2,641. The Trust's own herd, at Gracemount Farm, Edinburgh, was one of the first of the tubercle-free herds, and the aim of the committee is to produce milk which not only complies with the legal standard but is as free from bacteria as is humanly possible. Mention is also made of research work carried out under the auspices of the Trust by the assistant medical officers of the sanatorium colony. This has included investigations on the seasonal variation in tuberculosis, the action of blood serum on the growth of tubercle bacilli, and the phagocytic activity of the polymorphonuclear leucocytes.

PROBABLE EFFECT OF THERAPEUTIC INJECTION OF SERUM ON AGGLUTINATION TESTS FOR LEPTOSPIRAL INFECTION

BY

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It is sometimes asked whether the agglutination test for leptospiral infection is worth while if a patient has already received a therapeutic injection of anti-leptospiral serum. The answer to this depends on knowing how quickly the injected antibodies decrease in the blood stream, and the matter could best be settled by injecting anti-leptospiral serum into healthy human volunteers and performing agglutination tests on serum taken from them at intervals after the injection. It has not been possible to do this; but the rate of disappearance of agglutinins was watched in four rabbits, when it was found that the antibodies decreased to a very low titre within forty-eight hours in three and within 120 hours in the other. The rabbits were young adults of approximately equal weight, and were kept under the same conditions. Dr. W. W. Kay kindly calculated the volume of the plasma of one of the animals by the injection of Congo red and the determination of the dilution of it in the plasma by the Pulfrich photometer. The volume was found to be 67 c.cm., and this was assumed for the other three animals. On this basis an intravenous injection of 0.67 c.cm. of anti-leptospiral serum (B. W. and Co.) was made into each animal after a preliminary specimen of blood had been withdrawn. Small amounts of blood (1 to 2 c.cm.) were taken from an ear vein at periods of from five minutes to five days afterwards. The agglutination tests were performed by the well-known technique of Schüffner and formolized leptospira used. It was found that before the animals were injected their serum did not agglutinate the leptospira significantly.

By injecting 0.67 c.cm. of the therapeutic serum into 67 c.cm. of plasma of each rabbit a hundredfold dilution was made; and therefore, since the titre of the therapeutic serum was 1 in 30,000, it would not be expected that the rabbits' serum, taken after the injection, would agglutinate the leptospira in a dilution of more than 1 in 300. Actually this power of agglutination was not reached at all in one rabbit, and was found weakly in two after the first five minutes only and in one at seven hours, twenty-four hours, and forty-eight hours.

Table showing Results of Agglutination Tests on Rabbits

		1/10	1/30	1/100	1/300	1/1,000
R. 201	Before ..	±	−	−	−	−
	5 mins.	±	+	+	−	−
	7 hrs. ..	+	+	±	−	−
	24 „ ..	+	+	±	−	−
	48 „ ..	+	±	−	−	−
	120 „ ..	±	−	−	−	−
R. 202	Before ..	−	−	−	−	−
	5 mins.	+	+	+	−	−
	7 hrs. ..	+	+	+	±	−
	24 „ ..	+	+	±	±	−
	48 „ ..	+	+	+	±	−
	120 „ ..	±	−	−	−	−
R. 262	Before ..	±	−	−	−	−
	5 mins.	+ +	+	+	±	−
	6½ hrs. ..	+	+	+	−	−
	24 „ ..	+	+	−	−	−
	48 „ ..	+	−	−	−	−
R. 263	Before ..	−	−	−	−	−
	5 mins.	+ +	+	+	±	−
	6½ hrs. ..	+ +	+	+	−	−
	24 „ ..	+	+	+	−	−
	48 „ ..	+	−	−	−	−

The table shows that the decrease of agglutinins is variable, but in three of the animals the reduction at forty-eight hours was to a concentration of one-tenth or less of that calculated from the dilution of the therapeutic serum in the animals' plasma.

Assuming a similarity in this respect between the rabbit and the human being, when serum has been given to a patient the injected antibodies decrease rapidly. How may this be applied to clinical medicine? In order to estimate the volume of the patient's plasma the chief observation needed is the body weight. The proportion of plasma in the total blood volume can be found by the haematocrit or, if the red blood corpuscles and haemoglobin are normal in amount, it may be regarded as 55%. Then, taking the specific gravity of plasma as 1 and the weight of blood as one-fifteenth part of the body weight, the plasma volume can be calculated in cubic centimetres. Thus a patient of 12 st. with plasma volume equal to 55% blood volume would be calculated to have 2,750 c.cm. of plasma, and an injection of 40 c.cm. of serum would be diluted approximately seventy times. The highest agglutinative titre produced in the patient's plasma (or serum) can be calculated from the original titre of the therapeutic serum and the dilution produced in the patient's plasma. The result of tests on serum taken at any time after the therapeutic injection can be compared with this calculated result, and if the observed titre is higher than the calculated one the result will appear more and more significant, according to the extent of the difference; while in serum taken forty-eight hours or more after the therapeutic injection a titre equal to the calculated one will be possibly significant.

In conclusion, it appears that after an interval of seventy-two hours the effect of a therapeutic injection of anti-leptospiral serum on an agglutination test of the patient's serum can be ignored. If the interval between the injection and the test is less than seventy-two hours the test will still be useful if the effect of the antibodies injected is considered in the way indicated in this note.

The Chief Medical Officer of the Department of Health for Scotland, in a recent memorandum to all Scottish practitioners, points out that while the treatment of "nervous" as of other types of war casualties will for the most part be carried out by the Emergency Medical Service, general practitioners will come across cases of nervous disorder attributable to war conditions in their own practices, and often in patients whose constitutional predispositions they already know. Such cases will include not only neuroses arising more or less directly from air raids—emotional panic, hysterical manifestations, and shock reactions—but also those caused by continuous exposure to the strain of war—anxiety states, neurasthenia, conversion hysteria (paresis, aphonia, fits, fugues). There are also likely to be instances of confusional states and even of definite psychoses. The memorandum then proceeds to call attention to the primary need for differentiation between trauma and organic disease of the central nervous system on the one hand and neurosis on the other. Having excluded organic disease the practitioner should do everything in his power to reassure his patient by persuading him that his symptoms indicate no serious injury and will soon disappear. The use of such terms as shell-shock, hysteria, neurasthenia, and neurosis, whether orally or in any certificate, should be sedulously avoided. A warning is given against the frequent or prolonged use of sedatives. For a patient with an uncomplicated neurosis, the memorandum continues, active employment is the best remedy; if return to work is not immediately possible he should be encouraged to take up some useful domestic or communal activity. As a general rule patients suffering from neuroses should be treated at home; if they are sent in to hospital unnecessarily their condition often becomes aggravated and they are apt to sink into chronic invalidism.

Clinical Memoranda

Streptococcal Meningitis with Recovery

The following notes of a case of streptococcal meningitis may be considered of interest in view of the patient's recovery.

CLINICAL HISTORY

The patient was a woman aged 32 who had been in indifferent health for some time. She gave a history of previous throat infection. On January 7, 1940, she complained of feeling generally unwell. The following day she had a sore throat and some pyrexia. Not wishing to be ill alone in her flat, she travelled by train for nearly a hundred miles, arriving at her destination in a collapsed condition. On the 9th she complained of general aches and pains, slight sore throat, severe frontal headache, and vomiting. She had no cough, her chest was clear, and her throat showed slight faucial congestion. Sinuses transilluminated normally. The temperature was 100° F. and the pulse 84. Next day the headache was easier, but there had been more vomiting. Further progress of the case was as follows:

January 11.—There was a sudden change in her condition from the previous evening. She was now in a semiconscious state and presented the following phenomena:

12 noon.—Neck stiff; pupils dilated, equal, very sluggish reaction to light. Disks normal. Right arm, increased muscle tone. Left arm, flaccid. Abdominal reflexes absent. Knee-jerks present and equal. Plantar responses: left, flexor; right, extensor.

4 p.m.—Coma increasing rapidly. Signs of meningeal irritation present.

4.30 p.m.—Deeply unconscious. Neck very stiff. Pupils, arms, and knee reflexes as at noon. Both plantar responses extensor. Kernig's sign positive. Temperature 102.4° F. Lumbar puncture: C.S.F. pressure 250 mm.; a few c.cm. of turbid fluid were withdrawn, and examination showed large numbers of polymorphonuclear leucocytes, and Gram-positive diplococci. The appearance of the organism in the film suggested that it was a pneumococcus, but after culture and tests for bile solubility it was found to be a haemolytic streptococcus. Treatment with sulphapyridine was immediately begun by intramuscular injections, 2 grammes being given as an initial dose, followed by 1 gramme every four hours.

January 12.—Condition improving. Lumbar puncture: C.S.F. pressure 180 mm.; fluid less cloudy, total sulphapyridine concentration 6 mg. per 100 c.cm. (7.5 mg. in the blood); cell content showed no change; smear gave a few single Gram-positive cocci, but culture was sterile. White blood count, 13,000: polymorphs 75%. Towards night the condition had improved to the extent that the patient was able to swallow, and further medication was carried out by mouth.

January 13.—Condition much improved. Temperature 98° F., pulse 68, respirations 20. Fundus oculi: disks pink and cup filled in. Meningitic symptoms much decreased. Plantar responses: right, extensor; left, indefinite. Blood sulphapyridine: 9.5 mg. per 100 c.cm. (total); free, 5 mg. Patient tried to speak.

January 14.—While the nurse was absent for a few moments the patient got out of bed and later walked back to it quite steadily and unassisted.

January 16.—Plantar responses both flexor. No headache. Able to carry on an intelligent conversation. Abdominal reflexes were still absent, and remained so throughout. Weakness in the right leg persisted for a few weeks, but eventually disappeared, to complete the patient's recovery.

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Reviews

"HOLISM" IN MEDICINE

The Inter-relationship of Mind and Body. The Proceedings of the Association for Research in Nervous and Mental Disease. Volume XIX of a Series of Research Publications. (Pp. 381 ; 28 illustrations. 36s.) Baltimore: The Williams and Wilkins Company ; London: Baillière, Tindall and Cox. 1939.

This book is a report of the meeting of the Association for Research in Nervous and Mental Disease held at New York in December, 1938. As Dr. Kanner neatly expressed it towards the end of the meeting, the greatest good to come out of the conference seemed to be a confutation of the premises implied in the wording of its general title, "The Inter-relationship of Mind and Body," for no one seriously subscribed to the dualism it entails. The "person as a whole" had become a universal psychiatric slogan. Indeed, this is supported by the increasing use made of ordinary therapeutic measures in the treatment of nervous and mental diseases. Prolonged narcosis, reduced oxygen pressure, hyperpyrexia, convulsions induced by insulin, metrazol, or even electrically, are instances of this tendency, not to mention the more ordinary use of sedatives, benzedrine, vitamins, and endocrine extracts. These hopeful methods of treating the mind through the body add point to the case against "lay" psychotherapy. Medically untrained people may gravely endanger their patients by ignorance, disregard, or erroneous assessment of somatic functions. So much depends on the ability to decide whether an organ dysfunction is an expression of a personality problem or a manifestation of tissue derangement. Only a medical man is in a position to distinguish between what is essential, incidental, or irrelevant. Despite a certain tendency to diffuseness and obscurity which is apt to cloud American medical literature to-day, as it used to cloud German literature before its eclipse, much interesting material was discussed at the conference. We would particularly mention the papers by Dr. Philip Bard and by Dr. J. F. Fulton, which, taken together, give a valuable account of the evolution of emotional responses. The main point which emerges is brought out by Dr. Fulton—namely, that there is a progressive increase of cortical control over the autonomic nervous system as one ascends the evolutionary scale. This is accompanied by a relative simplicity of the hypothalamus in man and anthropoids as compared with lower vertebrates, since more of its functions have been taken over by higher levels of the brain. Both authors sum up the situation on Jacksonian lines: "Everything present at subcortical levels is *re*-represented in the cerebral cortex."

Taken as a whole this symposium affords a commentary on and a criticism of a line of cleavage in medical thought which is most inopportunely appearing at the present moment in this country ; of this cleavage our correspondence columns have recently borne ample witness. Thus one writer expressed doubts as to the validity of all medical science, since it "is endeavouring to extract truth from the unknowable, which is man," while on the next page another correspondent boldly affirmed his belief that "only those patients who need analysis or hypnosis need a particular doctor to trust. Other people could equally well have confidence in State-selected doctors." Here obscurantism and materialism are seen in stark contrast. It is a symptom of that divorce between philosophy and craftsmanship which is incited by the increasing mechanization that at the present moment is threatening the very existence of civilization. It is of the first importance that any breach in our own ranks should be healed, and this book, though in some respects of somewhat specialist interest, is a welcome reinforcement of the doctrine of "holism" in medicine.

ANIMAL BIOLOGY

Principles of Animal Biology. By Lancelot Hogben, F.R.S. Second edition, revised, and with new illustrations throughout by J. F. Horrabin. (Pp. 415. 7s. 6d. net.) London: George Allen and Unwin, Ltd.

The second edition of Professor Lancelot Hogben's *Principles of Animal Biology* is to a large extent a new book. It is primarily a textbook for the upper forms of secondary and public schools and for students at universities and technical colleges ; but it may well be used by any intelligent and serious reader who wishes to gain a basic understanding of animal life and some knowledge of recent developments in the subject. The first edition was published in 1930 and has been out of print for some time. In this second edition the original and most admirable plan remains, but throughout the chapters have been most carefully revised and extensively rewritten. The illustrations are an attractive and effective feature of the work. All those in the earlier edition have been redrawn by Mr. J. F. Horrabin, and many new ones have been added or substituted. Here, as in other well-known and remarkable volumes from the same hands, the co-operation between author and illustrator adds materially to the value of the book. Here, too, both the general plan and the exposition of the subject-matter in each section or chapter demonstrate the excellence of Professor Hogben both as a teacher and as a writer. His clearness and accuracy are beyond question, and the development of his impressive technique is manifest throughout. The book deals with principles and is not a manual directing the dissection of types. This is just what is needed and is most useful both to the medical student and to others. It is in two parts, the first dealing with the vertebrate body as a going concern, including reproduction, development, and the machinery of inheritance : and the second dealing with the diversity of animal life under a unity of type, classification, and evolution. Its reading requires, as it should, close and progressive attention on the part of the student, and at the end of each chapter there are admirable questions or exercises as "topics for home study." Altogether this revision of his work has resulted in the production by Professor Hogben of as satisfactory a textbook as could be reasonably desired.

HEALTH ASPECTS OF FOOD CONTROL

Food Control. Its Public Health Aspects. A Manual for Regulatory Officers, Food Technologists, and Students of the Food Industry. By James Houston Shrader, Ph.D. (Pp. 514. 24s. net.) New York: John Wiley and Sons, Inc. ; London: Chapman and Hall, Ltd. 1940.

While an intimate knowledge of detail is nowadays indispensable to the effective functioning of a food controller, he should at the same time always retain at least a subconscious sense of the general principles involved, in order that he may be able to take a balanced and comprehensive view of the multifarious problems arising in his daily round. A work designed to be broadly informative in this way has been issued lately by Dr. J. H. Shrader, of Johns Hopkins University. Many methods of food procedure are aptly explained and discussed. Two of these, which will be noted here, are of special

interest on account of the much wider vogue which they have achieved in the United States than hitherto in this country.

In regard to pasteurization of milk, the opinion is expressed that, since the changes in milk which pasteurization produces are, for practical purposes, negligible, there is now no excuse for the marketing of raw milk. Nevertheless, it is wrong to suppose that pasteurization can compensate for unclean milk-handling, for the harmful products of bacterial metabolism are not abolished by it. Thermoduric bacteria found in pasteurized milk, though not pathogenic, are of importance, inasmuch as they indicate faulty management at some stage. If a pasteurized milk is negative to the phosphatase test, it may be assumed that all pathogens in it, including the tubercle bacillus, have been destroyed.

In regard to food canning, the second of the procedures selected, it is said that cleanliness is best ensured by employing the "sanitary" type of can, the lid of which is crimped on. The limited amount of water used in canning leads to conservation of the minerals and extractives present in the food. Most canned foods dissolve tin from the tinplate of the container, but the metal combines with protein to form an irreversible and insoluble compound. It is, therefore, harmless. The popular belief that the contents of an opened can develop dangerous properties unless promptly removed from the can is without foundation. Botulism from canned food principally occurs with home-canned food. There has been no case of botulism from commercially packed canned food in the United States since 1925. The author concludes that "canned foods are the safest foods which come to our tables, on account of the processing to which they have been subjected."

BLOOD TRANSFUSION

Traité de la Transfusion Sanguine. By G. Jeanneney, Professor of Medicine, Bordeaux, and G. Ringenbach, Chief of the Transfusion Laboratory. (Pp. 386. 110 francs.) Paris: Masson et Cie. 1940.

Professor Jeanneney and Dr. G. Ringenbach have provided in their book on blood transfusion the most practical and up-to-date discussion of this important subject yet available. The book is clearly written by men with practical experience of the problems discussed, but at the same time they have not confined themselves to their own personal point of view. Following an adequate historical account of the development of the use of transfusion in medicine there are chapters devoted to the indications for and results of transfusion in various clinical conditions, the problems of blood storage, technical methods, reactions and accidents following transfusion, and the organization of transfusion centres. Considerable stress is laid upon the technique and value of immuno-transfusion. This is obviously used by the authors as a routine procedure in certain cases. Banks of stored blood they consider an essential part of any adequate transfusion service, and they state dogmatically that reactions are no more frequent after stored than after fresh blood.

The only section of the book which appears inadequate is that dealing with the question of the preparation of grouping sera. The extreme importance of using high-titre sera is not sufficiently emphasized, a titre of 1/16 being considered adequate. Difficulties in grouping that occur because of the presence of A_2 agglutinogen are also not mentioned. There are over 200 good illustrations, and a large bibliography containing chiefly Continental references. No one interested in blood transfusion should fail to read this book.

Notes on Books

The last war provided a great stimulus to the study of anaerobic bacteria. The present war may have a similar effect. In anticipation of this Dr. ANDRÉ PRÉVOT has prepared a monograph, *Manuel de Classification et de Détermination des Bactéries Anaérobies* (Masson et Cie; 50 francs), in which each species of organism is classified and described. The classification suggested covers the whole field of bacteriology, though the descriptions of the individual species are limited to the anaerobic members alone. It is based primarily on morphology, including motility, spore formation, and the reaction to Gram's stain. Many of the generic names that are gradually coming into general use, like Brucella, Haemophilus, and Lactobacillus, have been sacrificed, and several new names introduced, like Ristella, Zuberella, Catenabacterium, Paraplectrum, Inflabilis, Caduceus, and so on. Whether the present is a good time to bring forward a new system of bacterial classification is open to question, but the descriptions given of the very large number of individual species will be of undoubted value to bacteriologists whose knowledge of anaerobic bacteria is limited to a few of the common pathogenic types.

The *Proceedings* of the Seventh Summer Conference on Spectroscopy and its Applications, held at the Massachusetts Institute of Technology in July, 1939, have been published in New York by John Wiley and Sons, Inc., and in London at 16s. 6d. by Chapman and Hall, Ltd. The volume contains in somewhat abbreviated form the twenty-nine papers presented at the conference; these include a statistical study of lead in human blood and urine, a paper on the application of ultra-violet absorption spectroscopy to biology and medicine, and spectrochemical studies of certain of the male hormones.

H. K. Lewis and Co. have now published at 17s. 6d. a fourth and enlarged edition of HENRY H. CLAY'S *Sanitary Inspector's Handbook*. The chapters on food and food premises have been rewritten to accord with the provisions of the Food and Drugs Act, 1938, and the more technical parts of the book have been revised and amplified. Sir Wilson Jameson in his introduction to the first edition said that the need for a handbook of this sort is beyond all doubt, and the continued popularity of Mr. Clay's work fully endorses Sir Wilson's commendation.

Preparations and Appliances

DIETARY SUPPLEMENTS IN TABLETS

"Complevite" (Vitamins Ltd., Upper Mall, Hammersmith, W.6) are tablets containing the vitamins and minerals deemed necessary to supplement the ordinary diet. The vendors supply a brochure in which they show by means of instructive tables that the average intake per head in this country is seriously deficient in vitamins B_1, A, and D, and also in calcium. Complevite is made up in tablets of two colours; both contain calcium and phosphorus. The green tablets also contain vitamins A and D, whilst the white tablets also contain vitamins B_1 and C, iron, and trace of minerals. This method of dispensing avoids the danger of chemical interactions between the different vitamins.

The dose recommended (one tablet of each colour three times a day) is sufficient to compensate for those deficiencies that are known to be present in the average dietary of the population. The cost is 4s. 6d. for 120 tablets, and this works out at just below 3d. a day.

HEXOESTROL

"Hexoestrol" (Burroughs Wellcome and Co.) has the chemical structure of 4:4′-dihydroxy-γ:δ-diphenyl-*n*-hexane. It is closely related to the synthetic oestrogen diethylstilboestrol, which it resembles both in chemical constitution and in physiological action. Hexoestrol is, however, less liable to produce undesirable side effects than is diethylstilboestrol.

TRACTION BY ELASTIC TENSION FOR FRACTURED FEMUR

BY

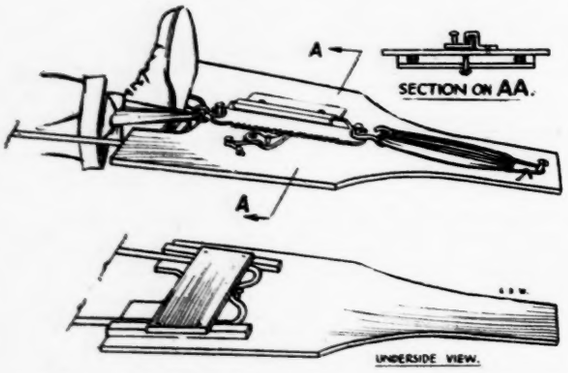
W. REGINALD WILSON, M.A., M.B., B.Ch.

The following observations are based mainly on ambulance study and practice at a first-aid post. It is hoped that they will prove at least interesting to others who have or may have the care of accident cases.

Concerning the application of traction to a limb for the correction of overriding of broken fragments of bone, both the methods in common use for the femur have defects inherent in them which seem to call for remedy. The more simple one, as done in ambulance work, consisting of a bandage around the ankle, pulled tight to the lower end of a Thomas splint, falls short of the ideal in the smallness of its range of action. No sooner have the muscles begun to relax than it ceases to pull. The gradual and progressive reduction of overlap, instead of proceeding to completion, comes to a dead stop, and the most that can now be looked for is that the very small degree of restitution obtained shall be preserved. The method of extension by a weight suspended over a pulley, on the other hand, exerts its influence over far too great a range. It pulls as long as ever it is allowed to remain so attached and unrestrained; and not only so, but the pull remains as strong throughout the process as it was when first applied. The broken ends may therefore be drawn out of contact with each other and hope of union prejudiced.

Method of Applying Elastic Tension

What is now suggested is the use of elastic tension as the means of applying the force. We have used circular bands cut squarely from damaged air tubes from the tyres of motor-bicycles or motor-cars. A reasonable degree of precision can be obtained by calibrating them against a spring balance of the tension kind with a foot-rule. (If the splint is too short for this added length a board can be fastened to project



beyond the end, and attachment made to it.) We first decide how many pounds of pull we wish to remain in the part after reduction of the displacement. Having attached the band or bands to the loop round the foot, we pull the other end towards a stud or hook at the further end of the board. The elastic is given the amount of elongation we had found by measurement beforehand to correspond with the tension we desire—7 to 10 lb., for instance—and there should then be superadded an amount of stretch equal to the amount of shortening of the bone, as ascertained originally by comparison with the sound limb. If the tension corresponding with this amount of stretch seems unreasonably great or small we must either add to or diminish the strength of our elastic element, in which case we shall of course have to set our basic tension afresh, especially as this is the one we must be the more particular about. It has been found that an abnormally strong wrist is not needed to obtain a pull of even 40 lb.

The weak point about this rig is that if muscular spasm should recur so also will the displacement, together with its distressing self-aggravation and pain. This can be provided against by tying a cord alongside the elastic to withstand the jerk without yielding—a measure that is imperative if further transport is in contemplation. This action can, however, be made automatic by means of a ratchet and pawl, as shown in the figure. Any handy metal-worker can make the essential part, and a carpenter the mounting, which slips on over the end of the splint.

This method is recommended as affording a simple means of correcting displacement from a very early stage and maintaining the position until a Hodgen or other good splint can be applied which allows of flexion of both hip and knee and does not interfere with nursing duties.

Another suggested use for elastic bands is in cases of operation on the chest—for example, breast—where an equable pressure is desired without restraining respiratory movements.

PROTECTION OF GLASS IN HOSPITALS

The Research and Experiments Branch of the Ministry of Home Security, in a memorandum on the protection of glass in hospitals, mentions three ways in which the scattering of glass in vertical windows can be reduced: (1) by covering the windows with wire netting of 1/2 in. or smaller mesh fixed to detachable frames; (2) by covering them inside with light-weight screens, which will cause the broken glass to fall close to the window; (3) by covering the glass with what the memorandum terms anti-scatter material. There are four ways in which this last can be done, and the memorandum gives them in the order in which they are most effective. (1) Strong textile netting or other fabric stuck firmly to the glass. This is best applied with a preparation insoluble in water, such as varnish or lacquer, and if an extra coat of varnish is given after the first is dry the whole can be wiped down with a damp cloth if it should get dirty in use. If paper is used it should be thick and tough; "criss-cross" strips are not recommended. (2) Cellulose film with varnish or lacquer as a waterproof coating; if cellulose acetate is used a special adhesive is required. (3) Strips of material not less than 1½ in. wide and spaced to give not more than 6 in. of clear glass between the strips. (4) Liquid coatings, but these are not expected to be effective on panes of more than four square feet. Many preparations, some including rubber latex, are on the market, but hospitals are warned against accepting the unauthenticated claims of the advertisers. Some of these preparations are unreliable from the start, states the memorandum, some are useless in ten days, and few have survived three months' exposure. Advice on them can be obtained from the Building Research Station, Garston, Watford. Supports underneath glazed roofs, across the glass at about two-foot centres, will help to keep fractured glass in place, particularly if it is wired; wooden battens about 1 by 1/2 in. securely fixed to the glazing bars will also serve. Similar support can be given to glazed roofs by wire netting close to the glass. Temporary weather protection after the fracture can be secured if the glazing is covered externally with a suitable hessian-bitumen treatment. All glass in operating theatres except that in utensils and suspended light fittings should be removed. Window openings should be completely bricked up or wholly barricaded, and any roof light opening should be covered by concrete slabs or sandbags on timber. If the operation light is a single freely suspended unit fracture of the glass is not likely, especially if the window openings are bricked or barricaded. Copies of the memorandum can be obtained from the Research and Experiments Branch, Ministry of Home Security, Forest Products Laboratory, Princes Risborough, Bucks.

Huquette Meslin (*Thèse de Paris*, 1940, No. 62), who records two cases in infants aged 4 and 5 months respectively, stresses the rarity of primary purulent meningitis due to organisms of the typhoid group, the condition being even rarer in the infant than in the adult. The prognosis is almost always fatal and treatment unavailing. In both Meslin's cases the symptoms were those of meningococcal meningitis, but *Bact. typhosum* was found in the cerebrospinal fluid in one case and *Bact. paratyphoid* B in the other. Both were fatal. Necropsy was not performed.

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VACCINATION AGAINST TUBERCULOSIS WITH THE VOLE BACILLUS

The history of scientific research abounds with instances of advance in one field following on a discovery, perhaps unimportant in itself, in another. The frontal attack is not necessarily the most successful. Progress may be suspended till a chance clue obtained by a worker in some entirely different subject points the way to the real method of approach. A striking example of this is afforded by the recent observations of Wells and Brooke[1] on the immunizing power of the vole acid-fast bacillus. Some years ago Elton at Oxford was anxious to find out the causes responsible for the great variations noticed from year to year in the numbers of wild rodents. Voles, for example, would increase over a period of three or four years and then die in prodigious numbers within a month or two for no obvious reason. In his search for likely causes Elton naturally considered the possibility of epidemic infection of one kind or another, such as had been shown by Topley and his colleagues to be responsible for wave-like fluctuations in the numbers of mice observed under laboratory conditions. He was successful in interesting Wells in the subject, and it was not long before a high mortality among voles in different parts of the country provided material to work on. Post-mortem examination revealed the presence in some of these animals of a curious disease resembling partly tuberculosis and partly rat leprosy. Acid-fast bacilli were abundant in the lesions, and cultivation resulted in the development of colonies on suitable media. Pathogenicity tests showed these organisms to be highly virulent for voles, but relatively avirulent for guinea-pigs and rabbits. Further work left little doubt that they were tubercle bacilli of a type hitherto undescribed, closely related to the human and bovine types but nevertheless distinct from them.

The possibility of protecting against tuberculosis in mammals by this new organism had clearly to be investigated. Preliminary results of this inquiry obtained by Wells and his colleague Brooke are now recorded. A small initial experiment in which guinea-pigs were vaccinated subcutaneously with caseous material from naturally infected voles and inoculated nine months later with a culture of bovine bacilli of low virulence showed a great difference between the vaccinated and the control animals. In a second experiment two groups of five guinea-pigs were vaccinated with 1 mg. and 0.1 mg. respectively of a pure culture of the vole acid-fast bacillus. Three months later they were inoculated, along with a control group of five animals, with 0.00001 mg. of a virulent human tubercle strain. All the control animals died of generalized tuberculosis within three months. Of the animals vaccinated with 0.1 mg., one died of tuberculosis within two months, two developed slight glandular enlargement, and two showed nothing but a local abscess. The five animals vaccinated with 1 mg. developed a local abscess only. The protective value of vaccination, particularly with the larger dose, was very striking. In a third experiment, which was marred by the death from intercurrent epidemic infection of a large number of the animals, a comparison was made between the protective power of the vole acid-fast bacillus and the well-known B.C.G. strain. Four weekly doses of vaccine were given, aggregating to a total of 2 mg. of culture with the vole bacillus and to 30 mg. with the strain of B.C.G. Five months later half the animals were infected with 0.000001 mg. of virulent human bacilli and half with the same dose of virulent bovine bacilli. The animals were killed after eleven weeks. The sixteen control animals had extensive generalized tuberculosis. The eight surviving animals vaccinated with B.C.G. likewise had generalized tuberculosis. Of the fifteen surviving animals vaccinated with the vole bacillus there were a few small tubercles in the lungs or viscera in four, while the remainder had no lesions at all or just a small local abscess. The number of animals was unfortunately too small to render the comparison between protective power of the vole and the B.C.G. strain statistically convincing.

Taking the three experiments together, there seems little doubt that a considerably greater degree of protection was afforded by vaccination with the vole bacillus than with any previously described organism. All who have worked with the B.C.G. strain know how difficult it is to prevent the development of experimental tuberculosis in guinea-pigs by its use. With the vole bacillus, on the other hand, complete or almost complete protection was obtained in the great majority of the animals tested. It would be foolish to draw far-reaching conclusions from the results of these few experiments, but it would be equally foolish to close one's eyes to their possible importance. Observations must now be made on monkeys and on cattle. If these prove satisfactory, then a vaccine should be available which has many advantages over the unstable and relatively ineffective B.C.G. strain. The subject is of such importance that it is to be hoped the war will not be allowed to interfere with its further investigation.

[1] *Brit. J. exp. Path.*, 1940, **21**, 104.

SHIP RATS

Companionate to the seafarer yet never companionable, the rat is an unwished-for traveller in many ships. His presence in holds and about living quarters is notoriously detrimental, inasmuch as he destroys fittings, plunders and contaminates food, and may in addition be the means of fostering and transmitting to man a fatal infection. Rats board ships in port either with cargo or by way of gangways and hawsers. They establish themselves in vessels still under construction, in which they subsist precariously upon the remnants of the workers' dinners until the day of plenty comes when stores are taken in and the ship puts out to sea. Since ship rats proliferate with remarkable rapidity, action for their repression is now customary under regulation in the shipping world. Fumigation

with hydrocyanic acid, the method most approved at present, may often come near to exterminating the intruders, but any ship which has harboured rats is liable to be reinfested, and in that event will in due course again call for disinfestation. Such repeated fumigations, together with the detention in harbour which they entail, are costly to all concerned, and the question perforce arises, "Is there no better way?"

To this question the answer nowadays may be given in a clear affirmative. Prevention beforehand is obviously better than reiterated fumigations after the event, and prevention consists in making a ship rat-proof—that is to say, so difficult for rats to live in that they will speedily die out or else leave the ship for an environment more conducive to rat welfare. How the process of rat-proofing should be conducted is set forth in an instructive pamphlet issued recently by the United States Public Health Service.[1] When proofing is undertaken in the case of an old ship, or in the case of a new ship when it is first envisaged after construction is well advanced or possibly completed, it becomes necessary to insert metal collars round pipes passing through bulkheads, to erect sheet metal partitions round food stores, to insulate countless enclosed spaces in which rats are prone to nest, and to effect a multitude of other adjustments, all of which taken together amount to an elaborate scheme of work, costly to construct, even more costly to maintain, and attended by the further demerit of adding to the weight of the ship. The best way on the grounds alike of expense and efficiency is that the ship should be built rat-proof. She should be designed rat-proof from the earliest outset, for rat-proofing without expense, as is well said in the pamphlet, can be done "on the blue-prints."

The principle in rat-proof designing is to eliminate all enclosed spaces which are not necessary for the functioning of the ship, and to ensure that any inevitable spaces permitted to exist are clear to view in all their extent. Food and other supplies in mass should be stored against a rat-proof bulkhead or surrounded by metal partitions. The clearance of such partitions and of the lower edges of doors should not exceed three-eighths of an inch, which is as easy to effect as a three-quarter-inch clearance, and yet the "former is rat-proof while the latter is not." The upper surfaces of electric cables should be open to inspection lest rats nest upon them, and the same applies to pipe lines and ventilating ducts. The terminals of ventilating ducts, at both intake and exit, should be protected by screens of copper or other metal. Refrigerators, too, require attention, as rats may build nests in them. They should be made entirely of metal with every joint tight. All furniture and fittings should be of steel. Finally, every compartment of the ship should be so designed as to constitute a completely isolated rat-proof space. In this larger aspect the problems of rat-proofing and fire-proofing for ships are almost identical. The manner in which effect may be given to the recommendations above summarized is well brought out by drawings and photographs.

[1] *The Ratproofing of New Ships.* By P. W. Clark, Senior Naval Architect, U.S. Public Health Service. Supplement No. 151 to the Public Health Reports. Washington: U.S. Government Printing Office. 1939. For sale by the Superintendent of Documents, Washington, D.C. (15 cents.)

EPITHELIAL LESIONS IN THE MOUTH AND THROAT

Deficiency diseases are usually due to multiple defects, and the analysis of the aetiology of particular symptoms is by no means easy. Nevertheless, nutritional lesions of the mouth and throat are gradually being dissected into their component elements. In a recent leading article[1] we discussed some biochemical studies of the syndrome of angular stomatitis. This syndrome is seen most characteristically in pellagra, but it is also found in a variety of states of deficiency and anaemia. It appears to be due to a break in the dehydrogenase chain of ferments, most frequently at the riboflavin nucleotide linkage, and it is usually relieved by riboflavin (vitamin B_2). Angular stomatitis has never been reported in epidemic proportions in this country, but in the last war there were so many cases of Vincent's infection of the mouth and gums among the troops that the condition became known as trench mouth. Vincent's organisms are not uncommonly found in normal-looking mouths, and King[2] has shown that inoculation of a healthy subject may fail to produce infection. Working from the information that Vincent's ulceration was very common in pellagra and the prepellagrous state, King has treated over thirty cases of Vincent's disease in this country with nicotinic acid with encouraging results. Thus the ability of Vincent's organisms to invade the tissues may depend on a deficient intake or utilization of nicotinic acid and its allied pyridine derivatives. Angular stomatitis is almost invariable in the Plummer-Vinson syndrome of dysphagia and anaemia, and here also there is new work to recount. Waldenström and Kjellberg[3] have shown that if a correct technique is employed filling defects can be displayed in the oesophagus in every case. They are usually just below the cricoid cartilage and are best seen in the lateral view. They point into the lumen at about right angles from the wall and look like a thin membrane. In advanced cases the incision is seen as a circular fold of the oesophageal wall with delay and difficulty in the passage of the meal and a bulb-like swelling of the hypopharynx during a certain phase of deglutition. Gerlings[4] has likewise stressed the importance of radiological examination in the Plummer-Vinson syndrome. If the cavity of the pharynx is viewed from behind, as the pathologist displays it on the post-mortem room table, two pairs of pockets can be seen on the anterior wall, the valleculae above the aditus of the larynx and the pyriform fossae below. In typical cases of the Plummer-Vinson syndrome the opaque medium stagnates in these pockets and is not cleared by repeated swallowing. This paralysis develops from the reduced sensitiveness of the atrophic pharyngeal mucosa, which disturbs the reflex mechanism of deglutition. Cicatricial stenosis of the mouth of the oesophagus increases the stagnation. Gerlings attributes the spastic strictures to fissures in the oesophageal mucosa, but cicatricial stenosis may also occur. Both these articles are illustrated by excellent photographs. It is difficult to correlate the *x*-ray pictures with the appearances on oesophagoscopy, for a great diversity of changes has been described: spasm, achalasia, and atrophic changes of the mucosa with fissures, erosions, cicatrices, and leukoplakia. Often a carcinoma develops secondarily, though it is encouraging to note that this is unusual in treated cases. The Plummer-Vinson syndrome has been curiously neglected in textbooks on the oesophagus. It is actually the commonest cause of dysphagia. It is usually associated with idiopathic hypochromic anaemia, and frequently

[1] *British Medical Journal*, 1940, **2**, 159.
[2] *Lancet*, 1940, **2**, 32.
[3] *Acta radiol.*, Stockh., 1939, **20**, 618.
[4] *J. Laryng.*, 1940, **55**, 143.

with achlorhydria and koilonychia. Waldenström points out that the Plummer-Vinson syndrome and koilonychia may occur without anaemia, but are nevertheless relieved by large doses of iron. They are therefore probably directly due to iron deficiency. This view has been opposed by Cordray,[5] who was unable to produce the lesions in rats by iron deprivation, but his objection does not appear very convincing. At present it is not easy to relate this work to the glossitis of Addison's anaemia, which is hardly ever accompanied by angular stomatitis or the Plummer-Vinson syndrome, but the explanation may well be found in a similar defect in cellular metabolism.

VITAMIN E AND MUSCULAR DYSTROPHY

Goettsch[6] was the first investigator to produce muscular dystrophy in rabbits and guinea-pigs by dietary means. Later Goettsch and Pappenheimer[7] gave an account of their histological findings in these animals, and ascribed the condition to the lack of some hitherto unrecognized dietary factor. Goettsch and Brown[8] found that the striated muscle of dystrophic rabbits contained less creatine than that of normal rabbits. Meanwhile several workers had reported on paresis in rats fed on a diet deficient in vitamin E (Evans and Burr,[9] Ringsted,[10] Burr, Brown, and Moseley[11]), and Olcott[12] had found degeneration of the muscles in these rats similar to the changes recorded by Goettsch and Pappenheimer in their rabbits. Einarson and Ringsted[13] found cord lesions closely resembling a combination of two of the most important systemic degenerations occurring in man—namely, tabes dorsalis and progressive muscular atrophy. Alpha-tocopherol (a chemical substance having vitamin E activity) given either to the mother of the suckling young or to the young themselves prevented the development of the paralysis (Barrie,[14] Goettsch and Ritzmann[15]), but Morgulis and others[16 17 18] showed that not only is vitamin E necessary for the prevention of this paralysis but also a substance which can be extracted from wheat germ by 70% alcohol and which is probably some part of the vitamin B complex. When vitamin E alone had been found to be curative the diets of the animals must have contained adequate amounts of the B factor. Lately McKenzie and McCollum[19 20] have demonstrated that muscular dystrophy in rabbits can be cured by giving alpha-tocopherol. A large increase in urinary creatine invariably attends the deficiency and may precede the gross symptoms by two weeks or more. A reduction in the output of creatine takes place within twenty-four to forty-eight hours of administration of vitamin E. There is no similar change in creatinine metabolism. The results of these animal experiments have lately been subjected to clinical trials. Bicknell[21] accepts the suggestion that two morbid conditions underlie the condition of muscular dystrophy—namely, degeneration of the spinal cord in the lumbar region and primary muscular degeneration. Of thirteen cases of muscular dystrophy treated with half an ounce of fresh dried whole-wheat germ twice daily for six weeks or longer, there was definite improvement in twelve, though none could be considered cured. One mentally deficient child of 14 showed no change after four months' treatment. Two cases of amyotrophic lateral sclerosis improved with seven and three months' treatment respectively; two patients in whom treatment was started in the last stages of bulbar paralysis died after four weeks. Two cases of tabes dorsalis and one of peroneal muscular atrophy were treated for two months without effect. Stone[22] has given 2 c.cm. wheat-germ oil daily together with yeast tablets to five patients with muscular dystrophy—one with muscular atrophy following anterior poliomyelitis and one with muscular atrophy after an attack of multiple neuritis or "neuromyeloradiculitis." He obtained a prompt response, but his dose must have been larger than that given by Bicknell. At first there was improvement in appetite, which was probably due to the vitamin B_1 in the yeast, then disappearance of pain on exertion, followed by greater resistance to fatigue and by replacement of rubbery muscles by normal muscle tissue. These workers strongly recommend that vitamin E therapy, preferably in addition to the vitamin B complex, be given extensive trial in the treatment of muscular dystrophy.

[5] *Ann. Otol.*, etc., St. Louis, 1940, **49**, 160.
[6] *Proc. Soc. exp. Biol.*, N.Y., 1930, **27**, 564.
[7] *J. exp. Med.*, 1931, **54**, 145.
[8] *J. biol. Chem.*, 1932, **97**, 549.
[9] Ibid., 1928, **76**, 273.
[10] *Biochem. J.*, 1935, **29**, 788.
[11] *Proc. Soc. exp. Biol.*, N.Y., 1937, **36**, 780.
[12] *J. Nutrit.*, 1938, **15**, 221.
[13] *Effect of Chronic Vitamin E Deficiency on the Nervous System and the Skeletal Musculature in Adults Rats. A Neurotropic Factor in Wheat-germ Oil.* Einarson and Ringsted, 1938, Copenhagen.
[14] *Nature*, 1938, **142**, 799.
[15] *J. Nutrit.*, 1939, **17**, 371.
[16] Ibid., 1936, **11**, 573.
[17] Ibid., 1936, **12**, 191.
[18] Ibid., 1938, **16**, 219.
[19] *Science*, 1939, **89**, 370.
[20] *J. Nutrit.*, 1940, **19**, 345.
[21] *Lancet*, 1940, **1**, 10.

SULPHAPYRIDINE BY INJECTION

It has been remarked before that the clinical trial of successful new sulphonamide compounds has far outrun their study by more elementary methods. Sulphanilamide, for example, had been given to thousands of patients before Marshall, Emerson, and Cutting published the first thorough study of its rate of absorption when administered by different routes, of the concentrations attained in the blood and cerebrospinal fluid, and of its rate of excretion in the urine. A somewhat similar contribution is now forthcoming to the study of sulphapyridine, and again from the U.S.A.; its subject is even more elementary, since it is concerned with the mere physical property of solubility. Whereas sulphanilamide is soluble to the extent of about 1% in water and can therefore be easily given parenterally if necessary, sulphapyridine has only one-tenth of this solubility, and parenteral administration therefore entails the use either of enormous volumes or of some form of suspension; neither of these proceedings has found much favour. There is an alternative in the highly soluble sodium sulphapyridine, but this has certain drawbacks: owing to its high alkalinity, intramuscular injection of this drug is apt to be painful and may even cause sloughing, while intravenous injection needs to be frequently repeated in order to maintain an adequate blood level. J. W. Haviland and F. G. Blake[23] therefore turned their attention to methods of dissolving sulphapyridine itself, and in a simple and straightforward study of its solubility under different conditions they have found that the drug dissolves to a greater extent in normal saline than in water and to a still greater extent in glucose solution. The largest amount dissolved in a series of experiments employing different solvents was 0.279 gramme per 100 c.cm. in 0.85% saline also containing 5% glucose. These observations therefore reduce by half the volume of fluid in which sulphapyridine must be contained if given by injection. Haviland and Blake have in fact treated 43 cases by this method, dissolving a standard dose of 2 grammes in one litre of glucose saline. Immediate effect can be secured by injecting the first dose intravenously; succeeding doses are given at eight-hour

[22] *J. Amer. med. Ass.*, 1940, **114**, 2187.
[23] *Amer. J. med. Sci.*, 1940, **199**, 385.

and later at twelve-hour intervals by the subcutaneous route. They have shown that this proceeding maintains satisfactory blood levels; these are in fact an improvement on those attainable by the oral route. The solution causes no local damage; perhaps the best evidence of its harmlessness is that it has been safely given intrathecally in cases of meningitis. The authors are well satisfied with the therapeutic effects obtained, and their method has an obvious value both in comatose patients and in those in whom vomiting interferes with administration by the mouth. Apart from these conditions it has an advantage in ensuring that the whole of the dose given takes effect; as is well known, the absorption of sulphapyridine from the gastro-intestinal tract is by no means always complete. It will be interesting to see whether this method of administration will eventually displace the use of sodium sulphapyridine altogether.

RADIATION REACTION IN THE LUNG

Radiotherapy has brought many problems in the after-care of cancer patients, and not least has been the difficulty of distinguishing between a recurrence or metastasis and a lesion due to radiation damage of the tissues. Common examples are the fibrosis in the axilla with brachial neuritis after interstitial radium, the necrosis of laryngeal cartilages after radium beam therapy, pulmonary fibrosis after irradiation of the thorax, and the massive pelvic induration after supervoltage therapy. A definite diagnosis can seldom be made from a single examination, and those experienced in the follow-up work of cancer clinics know how often their decision is belied by a subsequent necropsy. Warren and Spencer[1] began an investigation of radiation reactions in the lungs from the post-mortem material of 398 cases having tumours between the diaphragm and the neck, and selected thirty-one of these as showing histological evidence of radiation pneumonitis. Subsequent review of the case histories showed that only three of these thirty-one cases had not had any irradiation, so that the authors feel justified in describing the following histological changes as typical of radiation damage: injury to the alveoli and to the capillary endothelium; oedema, necrosis, and proliferation of the alveolar epithelium; fibroblastic proliferation in the alveolar walls; the formation of a hyaline membrane closely adherent to the alveolar walls. The last is most typical, and is seen in only one other common condition—namely, influenza, when it is associated with interstitial emphysema. Macroscopically Warren and Spencer emphasize the dry rubbery texture of the lungs, but their material did not permit of a comparison between the *x*-ray picture and the post-mortem findings. Engelstad has described[2] the spotted and striped shadows in the radiographs of the chest after irradiation: although these usually disappear, they occasionally persist as sharply outlined spots and stripes, and by comparison of successive radiographs it is generally possible to make a correct diagnosis. Warren adds that the decrease in size of the thoracic cage in pulmonary fibrosis is a useful point in differentiation from metastatic disease. In Engelstad's material, one in twenty of the cases of cancer of the breast, and one in five of those of cancer of the oesophagus, showed pulmonary lesions due to radiation, but only one of the cases came to necropsy for verification. Even the combination of pain in the chest and an unproductive cough with a typical *x*-ray picture of spots and stripes may be wrongly diagnosed in life as due to fibrosis, as was shown in the terminal stages by a case of Hodgkin's disease, in which a miliary form of lymphadenoma throughout the lungs was found post mortem. The amount of radiation and other technical factors do not alone determine the development of a radiation reaction, and the time of onset is equally variable. But the possibility of such changes emphasizes the point that no more normal tissue should be irradiated than is essential for the adequate treatment of the disease. Post-irradiation pulmonary fibrosis was first described by Finzi in 1922, and, although his observations were not published, it is largely due to his teaching that the condition is probably less common in this country than elsewhere.

[1] *Amer. J. Roentgen.*, 1940, **43**, 682.
[2] Ibid., 676.

THE YOUNG VISITORS

When the history of our period comes to be written there will be ample material for the historian to choose from, but one of the themes which cannot be neglected will be the organized evacuation of children from danger areas. Such a social experiment has never been attempted before, and it may be that half a century will have to pass before it will be possible to assess all its results and repercussions. All the more reason, therefore, why there should be reliable and sympathetic contemporary records of the great exodus of the young. Among such records Mrs. Strachey's little book *Borrowed Children* will find an honoured place.[1] Drawing from her personal experience of eight "honoured guests" received into her own house, the experience of her friends, and from well-attested records from all over the country, she describes the doings and reactions of the children and their hosts, and underlines the lessons to be learnt not only by the children but from the children. As may be expected from the "Godmother of Child Guidance in the British Isles," she lays particular stress on the knowledge gained from the study of children in Child Guidance clinics. She quotes from the lectures of Dr. Moodie and shows how the principles he lays down as applicable to behaviour problems of ordinary life apply to the extraordinary circumstances of evacuation. Emotional stress in the child discloses itself in many unexpected ways, and conversely much irrational behaviour from bed-wetting to pathological lying may be traced to the emotional stress of the evacuated child. Hostesses, billeting officers, social workers, and doctors will all be entertained and enlightened by a study of this very readable book, and if it will induce even some people to prefix the almost inevitable "don't" by the thought "I wonder why he does it," a great service will have been rendered.

LIGHTING IN FACTORIES

In wartime lighting conditions in factories and workshops are of first importance, since it is essential to secure that good work is done at a maximum speed, and at the same time that the workers do not suffer unnecessary fatigue. The Departmental Committee on Lighting in Factories, in its fifth report on this subject, which has just been issued,[2] states: "We have been unable to find any evidence that prolonged or even continuous work under artificial light has any deleterious effect upon health or safety, though it may be that at a later stage such effects may be established." This finding is especially noteworthy, since the conditions of work in many factories at the present time are new and unnatural to the majority of workers. At

[1] *Borrowed Children.* By Mrs. St. Loe Strachey. A Popular Account of Some Evacuation Problems and their Remedies. (2s. 6d. cloth, 1s. 6d. paper covers.) London: John Murray.
[2] Fifth Report of the Departmental Committee on Lighting in Factories. H.M. Stationery Office. (Price 3d. net.)

the beginning of the war the general black-out brought difficulties. The blocking of windows resulted in inadequate ventilation, and where hot processes were carried on the conditions were almost intolerable. Later, movable shutters were fitted with advantage. Most modern roof-lighted factories have a window area equal to 30% to 40% of the floor area; it is believed that an area equal to as little as 12% would be effective for these times. The committee recommends that the minimum standard for artificial lighting should be six foot-candles at three feet above the floor level. Some relaxation may, however, be allowed in workshops where large-scale work is done, and a higher scale may be needed on benches where fine work is done. For safety of movement in passage-ways and on stairs the lighting on the floor level should not be less than 0.5 foot-candle. Visits to factories have convinced the committee that the depressing and gloomy appearance of many works could be greatly relieved and even neutralized by covering the interior walls with light-coloured washes. Other recommendations are that special precautions should be taken to avoid glare in factories where the lights are less than sixteen feet above floor level, and that all lights should have effective shades of opaque material. Adequate steps should also be taken to prevent shadows, which may be dangerous. Finally the committee urges the need for supervision of factories by competent and qualified illumination engineers.

VIRUS TUMOURS IN ANIMALS

One of the main growing points in recent cancer research has been the study of newly discovered animal tumours in which a virus is concerned. Until these observations were made the only malignant growths known to be caused by a filterable virus occurred in birds, and their properties were so peculiar that it was uncertain whether any deductions applicable to cancer in mammals could rightly be drawn from their study. If any purely malignant tumour propagable by a cell-free filtrate—as is the Rous sarcoma of fowls—had been discovered in a mammal the position would indeed have been wholly altered; what has happened is less revolutionary than this, and the new animal tumours behave in a more equivocal way. In a class apart is the renal adenocarcinoma of the leopard frog discovered by Lucké; this tumour is unquestionably malignant, but the evidence[1] of its causation by a virus is indirect and not wholly conclusive. Much more attention has centred on the skin papilloma of the wild cottontail rabbit, which was first studied by Shope. This tumour is unquestionably caused by a virus—as, indeed, are certain papillomas seen in man—and readily transmissible to other rabbits. Occasionally in cottontails, and more often when transmitted to domestic rabbits, it undergoes malignant change, but the baffling feature of its behaviour is that as soon as this change occurs, and indeed sometimes before it, the virus ceases to be recoverable from the tumour. This is therefore not a clear case of malignancy due to a virus; it may even appear that the virus steps aside to give place to some other influence. Peyton Rous and F. G. Kidd have for the past two years attacked the problem of what happens in this tumour during and after malignant transformation, more particularly with a view to securing evidence that the virus persists in it. The first item of such evidence forthcoming was that antibody neutralizing the papilloma virus existed in the blood of rabbits in which the tumours had become malignant. More recently the idea has been developed that the local presence of this antibody can "mask" the virus. It has been pointed out by Kidd[2] that in large fissured and inflamed papillomas in cottontails, from which virus is not recoverable although actual malignant change has not occurred, exudation and haemorrhage may cause a local accumulation of antibody, and an extract will be inactive because it contains this antibody as well as the virus. This argument, however, cannot apply to growths in domestic rabbits, because these often yield no virus even when they are small and free from changes leading to exudation, and because the amount of antibody in the blood of these animals is low. A further piece of evidence that some inhibitory factor exists in these tumours when they become malignant, masking the presence of the virus, has now been reported by Kidd and Rous.[3] Papilloma in the cottontail rabbit yields virus; cancers in the cottontail—of which they have now seen twenty naturally occurring examples—do not, and a mixed extract of papilloma and cancer from the same rabbit does not. This suggested mixing extract of a cancer with active virus from another source, and the result was inactivation of the virus. It seems, therefore, that there is a substance in these tumours when they become malignant which suppresses the action of the virus, but how this can be reconciled with the idea that the continued growth of the tumour is due to the presence of the virus is by no means clear. Rous has also suggested that the change in character of the tumour is the result of variation in the virus; of this there is no proof. There must surely be some clue to this perplexing problem which has yet to be unearthed.

[1] *J. exper. Med.*, 1938, **68**, 457.

[2] *J. exper. Med.*, 1939, **70**, 583.

[3] Ibid., 1940, **71**, 469.

The Medical Research Council's Committee on Traumatic Shock and on Blood Transfusion has issued this week a pamphlet on the *Treatment of Wound Shock* in co-operation with the Army Medical Service. This is published by H.M. Stationery Office at 4d. (postage extra) as M.R.C. War Memorandum No. 1. The main headings under which the subject is discussed are: mechanism of wound shock, clinical recognition of wound shock, and treatment. Appendices give instructions for using the Army blood transfusion outfits and the M.R.C. blood transfusion outfit (as provided for the sectors and depots in London and the Home Counties); methods of continuous-drip blood transfusion and intravenous infusion; the reconstitution and administration of dried serum or plasma; administration of oxygen with the B.L.B. apparatus; and composition of solutions.

The Ministry of Health announces that Harvard University and the American Red Cross will shortly be sending to Great Britain a complete medical unit to study the preventive and clinical problems associated with infectious diseases under war conditions. The unit, consisting of a hospital and laboratory, will be staffed by Harvard doctors and American Red Cross nurses. The hospital will be organized and financed by the American Red Cross. The unit will be incorporated in the civil emergency hospital organization of the Ministry of Health and will be directed by Professor J. E. Gordon of Harvard University. The Minister of Health has expressed his high appreciation of this generous contribution to the wartime medical and scientific equipment of this country.

We regret to announce the death of Dr. J. S. EDKINS, formerly lecturer in physiology at St. Bartholomew's Hospital, and professor of physiology in the University of London.

Correspondence

Industrial Medical Service

SIR,—A recent order by the Minister of Labour makes compulsory the employment of whole-time medical officers in certain large factories in this country. This expansion of industrial medicine—even if it is only of a temporary nature—will be welcomed by all who recognize the importance to the nation of the fullest medical care of the industrial worker.

It will be readily appreciated that this young branch of medicine is highly specialized, and it follows that, if the maximum benefit is to be derived from the Minister's order, considerable care should be taken in both the selection and the training of candidates. For these appointments the services are required of well-qualified men and women, with good experience and wide knowledge and sympathies, and, following their selection, it is important that they should receive some training in their new work. Not only will it be necessary for them to possess some knowledge of the prevention and treatment of occupational diseases; they will also have to learn something of general factory hygiene and of the numerous factors which influence the well-being and output of the industrial worker. A great deal of research has been carried out in this field in the last twenty-five years, and it is important that medical men entering industry should know how to tap this fund of knowledge. In addition, they must know something of the structure of industry and of factory organization if they are to avoid elementary mistakes early in their industrial career—mistakes which may prejudice their chances of successful co-operation with the management at a later stage.

I venture to make two suggestions:

1. That assistance should be offered to employers in making appointments of industrial medical officers, and that all such appointments should be finally approved by the B.M.A. Central War Committee.

2. That a short course of about two weeks be made available for those appointed. There is little doubt that the co-operation of the Factory Medical Department of the Home Office and the London School of Hygiene would be forthcoming for this work.

These matters, I submit, require urgent attention if a great waste of opportunity and of effort is to be avoided. Finally, I would like to offer the wholehearted co-operation of the Association of Industrial Medical Officers in the practical training of those who are selected to undertake this work in industry.—I am, etc.,

RONALD E. LANE,
Chairman,
Association of Industrial Medical Officers.

Aug. 16.

X-ray Examination of Militiamen

SIR,—The recommendations of the Horder Committee have, as was to be expected, solved to a large extent this difficult problem, and it is now unlikely that any man will enter the Services who has suffered from pulmonary tuberculosis. Furthermore, it is probable that many others will be prevented from so doing by making full use of routine radiography, as mentioned under Section 2, (*a*) and (*b*).

There only remain the XX000 recruits who have now joined the Services who were symptomless and showed no physical signs of disease. These latter cannot yet, for the reason stated in the report, be examined by miniature radiography, but there is no reason now why they should not be examined in their respective units by fluoroscopy followed by routine radiography where indicated. The necessary apparatus and expert examiners are available in the Services, and it seems that it only remains for the individual radiologists to obtain the necessary sanction from their medical officers to undertake this work. I anticipate that each radiologist would be able to examine about 1,000 men per week in this way.—I am, etc.,

London, W.1, Aug. 16. J. V. SPARKS.

A Safe and Simple Tourniquet

SIR,—Those who have had experience in the casualty departments of hospitals are well aware of the inefficiency and dangers of the tourniquet in partially trained hands. The number of such hands to-day is legion. The types of tourniquet at present available to first-aid parties are not the most delicate of surgical instruments. One wonders how many will be applied in the near future tight enough to occlude the veins only (the commonest fault), or so tight as to cause injury and increase shock.

Six feet of ordinary two- or three-inch elastic bandage will make an excellent tourniquet. It is just wrapped tightly round the upper part of the limb, care being taken to keep the bandage at full stretch during the whole procedure. Each turn adds its quota of pressure until the arteries are fully compressed. Four to six turns are sufficient. It can be efficiently and quickly applied by the most delicate female. It is soft and can cause no local injury. It needs no special anatomical knowledge. It is cheap and easily obtained at any chemists. Could not some such simple article be supplied to first-aid personnel?—I am, etc.,

D. V. HAGUE, M.B., D.P.H.

South Petherton, Somerset, Aug. 8.

Protection of Head and Neck in Desert Warfare

SIR,—Under the heading "Desert Warfare" a picture paper recently gave two photographs which showed what the headgear of troops of the British Army and what that of the Turkish troops consisted of: (1) British troops marching under the desert sun at a temperature of 120° with no protection for the neck and spine; and (2) Turkish troops handling a gun, with a large protective covering of the neck and spine of dark cloth. Surely after the experience in the last war of the appalling number of casualties from heat-stroke and sunstroke among the troops in Egypt and Mesopotamia more adequate protection is vitally necessary than a steel helmet, which must, if anything, increase the concentration of heat after being worn for some time in the hot sun, and which gives no protection whatever to the neck.

I was in India during the last war, and I have never forgotten the large number of casualties from heat-stroke that occurred at this time of year among the Territorial troops in the trains they travelled in from Karachi across the Sind desert: this was due to ignorance of the need for covering the head and neck at all times while in the sun.—I am, etc.,

V. St. J. CROLEY,
Lieut.-Colonel, Auxiliary Force Medical Corps, India.

Bexhill, Aug. 13.

Nocturnal Enuresis

SIR,—Being shy of writing to so famous a *Journal*, I have waited for some more important correspondent to stress two most common causes of bed-wetting—tea and threadworms. Tea in the case of small children (and quite inconveniently so in some adults) causes marked increase in amount of urine, which the bladder cannot hold. Threadworms are notoriously irritating by night.

It is only to be expected that, given these two common causes, bed-wetting should be more frequently met with in children of "a low social standard." The well-brought-up child, with its intelligent mother or highly trained young Nanny, is not given tea; whereas the lower-standard parent shares her cup of strong drink (I speak of the brew of preration days) with the clamouring toddler on her lap, from teething time onwards.

Threadworms, too, are exceedingly common among children of such families, giving rise to nocturnal enuresis, among other unfortunate results; while the better-class child is far less frequently the victim of threadworms, for he is not given unwashed, unpeeled fruit straight from the coster barrow, nor is he allowed unwrapped sweets from the little corner shop kept by a hard-working but unwashed woman, who leaves her "wormy" offspring in the dim back parlour while she serves handfuls of "mixed lickerish" and loose sherbet.

I feel that I am talking like the old-fashioned parent who believes in one hefty smack rather than too much psycho-

logy; it all sounds so homely. But I write of those things that I do know, after many years' experience of infant welfare centre work. Nor is it only the under-fives who can suffer from threadworms. They may go long unsuspected in children of much older growth, or even adults.—I am, etc.,

DAISY AGNES STEPNEY, L.S.A.Lond.

Orpington, Aug. 17.

Ether Convulsions

SIR,—As one brought up in the "rag and bottle" era of anaesthesia, I hesitate to plunge into the troubled waters of ether convulsions. The article by Mr. Hamilton Bailey (August 17, p. 222), however, tempts me to pen this letter.

In the third edition of *Recent Advances in Anaesthesia* Hewer states that "most of the convulsions have occurred during deep anaesthesia," while in Cases 1 and 3 of Mr. Bailey's series the patients are reported as being "deeply anaesthetized." (He does not say what method of administration was in use.) One is led to wonder what part is played by the modern type of gas-oxygen-ether machine in the causation of this unhappy complication of ether administration. The amount of ether vaporized (actual weight) per unit of time by these machines with their large-volume ether container, often a veritable magnum, must be considerably greater than by the original type of Boyle's apparatus with its small bottle. I do not know how much is normally vaporized by these machines, but from the number of times the bottle appears to require refilling during an ordinary operation session, even when used by experienced administrators, I cannot help thinking that very little more would be needed if the "open" method were in use. In the days of the Clover and open technique, although we often saw ether tremor, a true convulsion was indeed a *rara avis*.

Possibly the Nuffield Professorship may be able to throw some light on this deplorable calamity, distressing alike to anaesthetist and surgeon.—I am, etc.,

Hassocks, Sussex, Aug. 17. H. NEWTON-ANDREWS.

First-aid Lectures

SIR,—As a lecturer and examiner in first aid for more than forty years I have been much interested in the letters of "A County Medical Officer, B.R.C.S." (August 10, p. 204) and Dr. Horace S. Savage (August 17, p. 237), and I agree with many of the points they raise. I always say that more than one lecture a week is not good but often confuses the members of the class. At the same time I think six lectures at weekly intervals *sufficient* for first-year candidates; these lectures, of course, to be additional to practical demonstrations. For advanced candidates it would be better to have a course of eight or nine lectures, also at weekly intervals, as a more advanced knowledge is required. Again, the practical demonstrations are absolutely essential.

I have been told that some lecturers simply read out of the book to the class, but this method cannot be expected to impress the audience. I am strongly of the opinion that many candidates know their work but do not seem able to express themselves in a satisfactory manner. For some years I have, therefore, made a practice of spending fifteen or twenty minutes at the end of the last two or three lectures in asking questions, and questions that are most likely to be asked at the examination; this has proved of great benefit. In addition I get the class to read up when they get home what I have been talking about and also to read up the subject of the next lecture: then they follow the lecturer much more easily. A few days ago I was examining and asked what an emetic was. I did not get the simple answer that an emetic is a substance which, when taken, makes a person sick until I asked the twelfth candidate. All the others talked round and round the subject.

In the old days the questions were left to the pleasure and discretion of the examiner, but the St. John Ambulance Brigade now always suggests the questions to be asked. The City of London Branch of the B.R.C.S., to which I have the honour to act as examiner and lecturer, has an excellent method. Where there is no written paper the examiner is given a list of questions to be asked, some for first-year people and others for the more advanced candidates. In this way everyone gets the same questions, and, as each one is examined privately alone the others cannot know what questions are being asked and there cannot be either any unequal luck or unfairness. In conclusion, I thoroughly endorse Dr. Savage's suggestion that it should be obligatory for all A.R.P. personnel to be examined periodically. In fact, I should extend this suggestion to all people interested in first-aid work.—I am, etc.,

London, W.1, Aug. 19. E. F. PRATT.

Cause of Appendicitis

SIR,—I read the annotation on this subject (August 3, p. 162) and wish to make a few observations. The cause of appendicitis must be fairly difficult to find and perhaps goes far back in the patient's history; otherwise the enormous amount of work done on this subject could not have failed to discover that cause.

1. Many babies fed on artificial milk or diluted cow's milk do not get sufficient cystine,[1] and most probably the greatest mischief is done in the first month of a child's life, when growth is proceeding at the fastest rate. Probably, also, many organ inferiorities are started and the seeds of many diseases are laid then—for example, the strange fact that whether or not a mouse will succumb to mammary cancer in its maturity is decided apparently by the milk it receives during the first day or two of its life.[2]

2. The appendix of the child and young adult is rich in lymphoid tissue. Thompson[3] showed that when rabbits had been deprived of vitamin A their lymphoid follicles showed signs of atrophy, and when rabbits were put on a diet deficient in vitamin A the number of organisms in lymphoid tissue was markedly increased.

3. It had been stated[4] that in about 20% of cases the vitamin A content of the mother's milk was considerably below the average, and it was doubted if more than two-thirds of the babies receive all the vitamin A they needed.

4. Appendicitis is attributed by Craig[5] to excess of food, more especially carbohydrates, and he also states that there is a close connexion between tonsillitis and appendicitis. Paton[6] has demonstrated the decrease in duration of catarrhal illness in school girls who habitually consumed large quantities of sucrose and other carbohydrates by withholding sugar from the diet. He also quotes Cameron, who has described the catarrhal child as having an excess of water in the body, and has also described the tendency of lymphoid hyperplasia in all situations and to catarrhal inflammation of the swollen and oedematous mucous membranes to this cause.

5. When there is excess of fatty acids in the intestine (due to excess of fat in the diet) the bile acids are mostly used up for the combination with fatty acids.[7] It has been shown that taurocholic acid is absorbed more easily in the ileum and with most difficulty in the jejunum; the converse applies to the glycocholic acid.[7] It is fair to assume that to preserve the taurocholic acid there is a stasis at the ileo-caecal valve, that possibly some of the taurocholic acid is lost (although it is impossible to demonstrate the presence of taurocholic acid in the faeces), and that the contents of the ileum become more viscid, thus tending to the precipitation of the cholesterol in the intestine; the contents of the caecum likewise become more viscid and faecaliths form in the appendix.

6. Owen T. Williams[8] believed that the saturated fats of beef and mutton formed calcium soaps, and that these were deposited in the mucosa and submucosa of the appendix and lowered its resistance to bacterial invasion. Certainly the absorption of calcium is lessened by excess of fats.[7]

7. Craig stated that in appendicitis there was a lowered alkaline reserve in the blood.

8. Appendicitis seems thus to be related to dietetic insufficiencies. It may be due to excess of fat or excess of carbohydrates, and there is in some people intolerance of excess of fat; in others, intolerance of excess of carbohydrates.

9. It may be predicted that, as in the last war there was a diminution in the incidence of appendicitis, so there will be in this. Moreover, owing to our better knowledge of vitamins the incidence of appendicitis in this war will be much lower.

10. The prophylaxis of appendicitis may have to include the diet of the infant.

11. I have noticed in several cases that there was a history of some abnormal muscular effort about three days before the onset of the appendicitis—for example, the lifting of buckets of gravel by a child, a dustbin by a young woman, etc.—violence which normally would be of no consequence but in acute appendicitis acts as the final precipitating cause.—I am, etc.,

Southampton, Aug. 5. E. SAKOSCHANSKY.

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[2] *British Medical Journal*, 1940, **1**, 58.
[3] Thompson, H. Gordon (1938). Ibid., **1**, 7.
[4] Nyland, C. E. (1938). Ibid., Epitome, **1**, 24.
[5] Craig, C. M. (1933). Ibid., **2**, 197.
[6] Paton, J. H. P. (1933). Ibid., **1**, 738.
[7] Verzár, F., and McDougall, E. J. (1935). *Absorption from the Intestine*. London.
[8] Thomson and Miles (1913). *Manual of Surgery*, **2**, p. 401.

India wants Medicine, not Magic

SIR,—The dramatic achievements of the Indian Congress Ministry during the period of its brief existence give one some idea of the future of medicine in that country. Instead of trying to raise the standard of medical education and equipping hospitals with modern appliances such as *x*-ray plant, radium, etc., considerable sums were spent in subsidizing quacks and unqualified practitioners of indigenous medicine. With a speed unparalleled in the history of medical education an ill-equipped institution was converted into a medical college, staffed with professors possessing mediocre qualifications, although competent Indians with high British qualifications were available on the spot. A large number of lady nurses were discharged and replaced by ward boys. A nation-wide campaign (as if this is required in a country where for centuries people have believed in the efficacy of magic and supernatural agencies) was launched on behalf of indigenous medicine (which enables diagnosis to be made and diseases treated without the aid of microscope, *x* rays, or even a stethoscope) and to discredit "Western medicine" and British qualifications.

No wonder that instances have occurred where Indian magistrates have refused recognition to certificates given by registered practitioners. Recently an Indian Judge of the Federal Court has used the B.M.A. platform for propaganda on behalf of indigenous medicine.

A frontal attack is imminent on medical science and on the general practitioner, who is struggling for an existence in an atmosphere of susperstition, nepotism, and sycophancy.—I am, etc.,

M. N. PAI, M.B., M.R.C.P.Lond.

London, W.1, Aug. 12.

Dental Disease in Pregnancy

SIR,—The paper on "tender teeth" by Messrs. H. T. Roper-Hall and A. P. Bertwistle (August 10, p. 188) is welcome evidence of medical and dental co-operation, for which the dental profession is anxious.

If I may be permitted one or two criticisms, I should like first to attack that hardy annual—the belief that pregnancy leads to a withdrawal of calcium from the teeth, and hence to increased dental disease at that time. Without entering into the argument as to whether or not the state of calcification of the teeth has anything to do with caries, I think it can be definitely stated that Fish[1] and other careful investigators have proved that there is no withdrawal of calcium from the teeth during pregnancy; indeed, in the experimental animal even complete removal of the parathyroid glands leads to no alteration in the degree of calcification of the teeth, although during the remaining life of the animal the whole skeleton is practically denuded of calcium. The statement that pregnancy results in decalcification of the teeth is copied from one obstetrical textbook to another, and is even used to justify certain treatments for the toxaemias of pregnancy. One wonders when the obstetrical experts will become acquainted with reliable dental research on the subject.

The increase of dental disease during pregnancy is largely a myth; any increase that does occur can be explained in several ways without including the calcium theory, such as lowered resistance to septic infection, defective hygiene, and the still prevalent belief that dental treatment during pregnancy is a cause of abortion.—I am, etc.,

JAMES CAMPBELL, L.D.S., R.C.S.Eng.

Berkhamsted, Herts, Aug. 10.

REFERENCE

[1] *An Experimental Investigation of the Dental Enamel, Dentine, and Pulp*, 1932.

Extra Milk for the Tuberculous

SIR,—The domiciliary treatment of the tuberculous has for many years included the supplying of extra nourishment—butter, milk, and eggs. This is done through the Local Authority, the Public Assistance Committee, or the Voluntary Care Committee, and has proved a very useful adjunct to dispensary treatment. But not all patients are on public assistance, and some local authorities restrict their expenditure on extra nourishment. Voluntary care committees find the burden heavy. Further, the system has been seriously affected by the fact that butter and margarine are rationed; eggs are dear and in some places unobtainable. Meat is, of course, rationed, and the Food Rationing (Special Diets) Advisory Committee of the Medical Research Council has said that, provided greater use is made of other sources of first-class protein by an increased consumption of milk and milk dishes, cheese and cheese dishes, and eggs, tuberculous people need not go short of essentials.

I fear that this proviso cannot be carried out unless milk is obtainable in larger quantities than is usually possible for the tuberculous family to-day. The National Milk Scheme now applies to expectant or nursing mothers, or children under school age, irrespective of means. The milk is 2d. per day, and in some cases free. I think there is a very strong case for extending this scheme to tuberculous people. A supply of first-class protein is essential to maintain resistance to tuberculosis. Patients are finding it increasingly difficult to obtain an adequate diet.

Answering a question in the House of Commons on August 7, Mr. Robert Boothby said it is not possible for the present to consider the extension of the National Milk Scheme to further categories of the population. I hope that this decision will be revised.—I am, etc.,

HARLEY WILLIAMS,
Secretary-General, National Association for the Prevention of Tuberculosis.

Tavistock House North, Tavistock Square, W.C.1, Aug. 20.

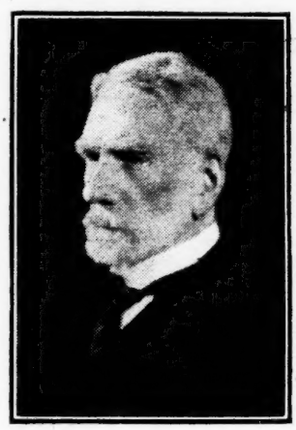
Soon after the war started the Mental Hospitals Association considered it advisable, in view of difficulties that had already arisen, to make representations to the Ministry of Health that the age laid down for male nurses in the schedule of reserved occupations—namely, 30—should not be increased. In this it had the support of the Board of Control, which requested the Ministry to make the desired representations to the Ministry of Labour and National Service. The age remains at 30, but even at that age a number of mental hospitals have experienced acute difficulty owing to a shortage of male nurses, and the Board of Control has therefore been asked by the Mental Hospitals Association to represent to the central departments that all qualified male nurses should be placed on the schedule no matter what their age might be. The Board, after careful consideration, has decided that it cannot in present circumstances recommend such a course. The annual report of the association—an attenuated document—also expresses regret that the work of the Interdepartmental Committee on Nursing Services should have been held up; there were expectations that its Mental Nursing Subcommittee would be able to make recommendations to assist materially in solving the problem of recruitment and training for mental hospitals. It is hoped that this work will be resumed as soon as possible after the end of hostilities in view of the difficulties of staffing likely to be encountered. Two outstanding figures in the work of the association have been removed by death during the year—namely, Sir William Hodgson and Alderman Robert Bruford—both of whom served in various executive capacities for twenty years, and tribute is paid to them in the report.

Obituary

WILLIAM RUSSELL, M.D., LL.D., F.R.C.P.ED.

Emeritus Professor of Clinical Medicine, Edinburgh University

William Russell, whose death occurred in Edinburgh on August 11 in his eighty-ninth year, was the last survivor of a distinguished coterie of physicians on the non-professorial staff of the Royal Infirmary—Byrom Bramwell, George A. Gibson, Alexander Bruce, and R. W. Philip were his immediate contemporaries—who enriched the reputation of Edinburgh Medicine during the closing years of the nineteenth and first decade of the present century.



Born in the Isle of Man, though his family hailed from Caithness, he received his earlier education at the Academies of Wick and Thurso. After graduating at Edinburgh in 1876 Russell spent some time as house-physician and pathologist to the General Hospital, Wolverhampton. Returning to Edinburgh he devoted much of his time to pathology, the then recognized portal to clinical medicine, and lectured upon this subject for many years in the extramural school. Elected an assistant physician to the Royal Infirmary in 1891, he received charge of wards in 1907, and in 1913 was appointed by the University as the first occupant of the Moncrieff-Arnott Chair of Medicine, from which he retired after reaching the age limit in 1919.

In his earlier years Russell devoted much time to the study of the cancer cell—a subject which was then attracting much attention—and to the disorders of the circulatory system. With George A. Gibson he published in these early days a book on clinical methods. The problems of blood pressure and gastro-intestinal disorders more especially engaged his interest in later life, and soon after he retired from the chair two monographs came from his pen embodying his views and observations.

Russell's teaching was strongly coloured by his pathological experience, and especially characterized by the stress he laid upon the physical examination and the interpretation of physical signs. Gifted with a broad philosophic outlook and a very logical mind, he expressed himself in unusually finished and accurate language.

At one time President of the Royal College of Physicians and of the Medico-Chirurgical Society of Edinburgh, he served for some years as the representative of the Royal College both on the General Medical Council and on the Board of Managers of the Royal Infirmary. He was also the principal medical officer to the Life Association of Scotland Insurance Company.

Awarded a gold medal for his thesis when he graduated M.D. in 1884, he received the Cartwright Prize of the Faculty of Physicians and Surgeons of New York soon afterwards for his investigations on the heart. The Royal College of Physicians of Edinburgh awarded him the Cullen Prize and appointed him a Gibson Lecturer. His Alma Mater conferred upon him the honorary degree of Doctor of Law. He had been a member of the Central Council of the British Medical Association for ten years at the close of the last century and was president of the Edinburgh Branch in 1911.

As a man of affairs Russell was universally respected and trusted. When he made a statement one knew that it was activated by no personal motives but that it embodied his sincere conviction. Somewhat egotistical at times in his pronouncements, his egotism was an attractive trait, for one never knew whether or not he was laughing at himself. He was imbued with the dignity and highest ideals of the profession, and one could not wish for a more generous or understanding chief and colleague.

He is survived by his widow, two sons and three daughters, four of whom are members of the medical profession, and one may forecast that "in their day his race will suffer no diminution in its lustre."

E. B.

[The photograph reproduced is by Lafayette, Ltd.]

ARTHUR EMLYN, who died at Cheltenham on July 5, had lived and practised there since 1926. He studied medicine at University College Hospital and at Glasgow, where he qualified in 1897. After an assistantship at Bathgate he was appointed assistant medical officer to the Isle of Man Lunatic Asylum, a post which he held for two years. A correspondent writes: After a short time in Orkney, Emlyn went in 1901 to the Shetland Islands, where he speedily gained the love and admiration of his patients in a large and scattered practice. Communications in those days were difficult, a great deal of visiting being done by sailing boat. It was in Shetland that he first met his wife, a daughter of the Manse, to whose loving influence he was never tired of acknowledging his indebtedness. Emlyn had no intention of settling down, however, and 1906 saw him take up an appointment with the Sudan United Mission in Northern Nigeria. He came to England in 1910 to get married and then returned to Nigeria, this time as principal medical officer to the Chamber of Mines of that country. In 1914 he was back in England, but was passed unfit for medical work in the Army, and practised in Harlesden until he moved to Cheltenham in 1926. Emlyn's work for the Presbyterian Church, of which he was an elder, was a dominating force in his life, and he will be remembered by all who knew him as a great Christian gentleman and a beloved physician. He had been a member of the British Medical Association since 1900.

We regret to announce the death of Dr. GEORGE FULLER ASHBRIDGE ENGLAND, formerly physician to the Royal Hants County Hospital, Winchester, and president of the Southern Branch of the British Medical Association. Born at Torquay in 1861, and son of William England, M.D., he was educated at Charterhouse and Caius College, Cambridge, graduating B.A. in 1882, M.B., B.Ch. in 1887, and M.D. in 1891. Dr. England's clinical training was at St. Thomas's Hospital, which he left in 1886 to become house-surgeon at the West London Hospital. After some years of general practice at Winchester he was appointed to the visiting staff of the Royal Hants County Hospital and became senior physician in 1921. He joined the British Medical Association in 1890 and held office as president of the Southern Branch in 1908 and again in 1923–5. On retiring from active practice he went to live at Milford-on-Sea.

The following well-known foreign medical men have died: Dr. Henry Johns Berkley, emeritus professor of psychiatry at Johns Hopkins University and author of *A Treatise on Mental Disorders*, aged 80; Dr. Alfred James Scott, emeritus professor of clinical paediatrics in the University of California; Professor Julius von Hochenegg, formerly director of the Second Surgical Clinic at Vienna, aged 81; Dr. Xavier Delore, an eminent Lyons surgeon; Dr. Albert Henry Freiberg of Cincinnati, an eminent orthopaedic surgeon, a leader of organized medicine in the State of Ohio, and formerly president of the American Orthopedic Association, aged 71; Dr. John Gerald Fitzgerald, formerly professor of hygiene and preventive medicine at Toronto and author of *Practice of Preventive Medicine*, aged 57; and Dr. Alfred Helsted, senior surgeon to the municipal hospital at Copenhagen, aged 70.

Medico-Legal

A PROBLEM OF WORKMEN'S COMPENSATION

The Court of Appeal decided in July an interesting dispute concerning the death of a workman who had been totally disabled by silicosis. The original Workmen's Compensation Act provided compensation for workmen injured by accident. Amending Acts made industrial diseases accidents for this purpose, and compensation for silicosis is provided for by the Various Industries (Silicosis) Scheme, 1931. Under this scheme, where the medical board certifies that the death of a workman has been caused, or that a workman is totally disabled, by silicosis or by silicosis accompanied by tuberculosis, the workman or his dependants may claim compensation as though the disease were a personal injury by accident. The medical board is appointed by the Home Secretary under the Silicosis and Asbestosis (Medical Arrangements) Scheme, 1931, and consists of specially qualified medical practitioners who act in panels of not fewer than two. This scheme lays down that any certificate it gives shall be conclusive evidence of the matters certified. A workman suffered from silicosis and was certified by two practitioners of the board as totally disabled. About four years afterwards they examined him again and certified that the impairment of his health was unaltered. Three or four years later he died. The coroner ordered a necropsy to be made by the workman's own doctor, a certifying surgeon of the district, and he reported that the cause of death was twofold: silicosis plus tuberculosis, and growths in the apex of the right lung which were independent of the silicosis. On behalf of the widow the trade union applied to the medical board for a certificate, and the same practitioners as had examined the man twice before certified that his death was not due to silicosis, with or without tuberculosis. They were not required to give a positive opinion about the cause of death, but presumably they took the view that it was the new growth. The widow claimed compensation on the grounds that the certificate of disability made the silicosis an accident, that the deceased never recovered from the accident, and that the result of the coroner's inquest showed that he died of it. The practitioner who performed the necropsy gave evidence that the silicosis must have accelerated the death; that he could not say what had caused the tumour, but it might have accelerated death as well; that the man would have died of either in due time, but at that time probably of neither alone; and that he had expected the man to die before from silicosis. The judge, however, held that neither the report made to the coroner nor the doctor's evidence was admissible, for the Medical Arrangements Scheme says that the board's certificate is conclusive. The Court of Appeal[1] confirmed his view of the law. In the first place, they said, the widow applied for compensation without having procured any certificate of the board that the death was caused by silicosis; and, secondly, the certificate given by the board on the application of the trade union said that the death was not caused by silicosis. Consequently, they said, her application was perfectly hopeless.

Hard cases make bad law, and, much as one may sympathize with this widow, it is difficult to find fault with the present arrangement by which medical questions are settled finally by an impartial tribunal. Both these medical officers of the board are, in fact, specially qualified and experienced practitioners, and there is not the slightest reason to suppose that two better judges of medical fact could be appointed, or that they did not give their certificate to the trade union with a full knowledge of all the facts, including the result of the port-mortem examination.

In other kinds of legal dispute—for example, where questions of insanity or of residual injury after a traffic accident are raised—the advantages of an impartial medical tribunal over a squabble of experts are obvious. This widow had bad luck, but on the whole the case seems to have been determined as well as possible.

[1] Ward *v.* Mayer and Sherratt, 1940.

The Services

CARE OF THE WOUNDED FROM NARVIK

The British Minister to the Norwegian Government has sent a letter of thanks to the Norwegian Foreign Minister for the assistance given by the small Gravdal Hospital after the first Battle of Narvik to the wounded from H.M. warships *Hotspur*, *Hardy*, and *Kimberley*. When the wounded were brought ashore there was only one Norwegian doctor in attendance, Dr. Lund, who, with his wife, assisted Surgeon Lieut. K. W. Donald from the *Hotspur* and some local residents in caring for the wounded day and night.

NAVAL AWARDS

The King has made the following awards for good services in the withdrawal of the Allied Armies from the beaches at Dunkirk:

D.S.O.

Commander Edward Cawdron Cordeaux, R.N. (ret.) (H.M.S. *Royal Eagle*).
Surgeon Lieut. John Jordan, R.N. (H.M.S. *Bideford*).

Bar to D.S.C.

Surgeon Lieut. Joseph Wishart Shield, R.N.V.R. (H.M.S. *Grafton*).

Mentions in Dispatches

Surgeon Captain Arthur Rowland Fisher, R.N. (ret.).
Surgeon Commander William Gordon Caulfield Fitzpatrick, R.N.
Surgeon Lieut. Noel Louis Fox, R.N. (H.M.S. *Mosquito*).
Surgeon Lieut. Godfrey Fraser Carey, R.N.V.R.
Temporary Surgeon Lieut. George Atherton Hart, R.N.V.R.
Surgeon Lieut. Peter Neale Shutte, R.N.V.R. (H.M.S. *Windsor*).
Surgeon Lieut. Francis Whitwell, R.N.V.R. (H.M.S. *Worcester*).
Temporary Surgeon Lieut. James Gorrie Brown, R.N.V.R. (H.M.S. *Whitehall*).

ARMY AWARDS

The King has made the following awards for distinguished services in the field:

O.B.E. (Military Division)

Lieut.-Colonel (acting Colonel) Arthur Austin Eagger, R.A.M.C., T.A.

M.B.E. (Military Division)

Lieut. (acting Captain) David James Waterston, R.A.M.C.

Military Cross

Captain Hugh Edward Carmalt, R.A.M.C., T.A.

CASUALTIES IN THE MEDICAL SERVICES

Prisoner of War

Major Stanley Ward Barber, R.A.M.C.

DEATHS IN THE SERVICES

Surgeon Captain EDWARD JAMES BIDEN, R.N. (ret.), died on August 1, aged 81, at Bromley, Kent, where he had lived in retirement since 1930. He was educated at Charing Cross Hospital, and took the L.S.A. in 1880 and the M.R.C.S. in 1881, after which he entered the Royal Navy, becoming surgeon commander in 1897 and retiring as surgeon captain in 1918. He served as surgeon in H.M.S. *Opal* during the Niger campaign of 1883 and saw more active service in 1886 in a punitive expedition to the Solomon Islands. He was staff surgeon of H.M.S. *Scout* in the Red Sea during the Dongola campaign in 1896, when he received the Egyptian medal and the Khedive's bronze star, and was staff surgeon of H.M.S. *Orlando* in 1900, when that vessel supplied contingents for the Legation guard in Peking, the defence of Tientsin, and Admiral Seymour's international relief column. Retiring from the active list in 1906, he took up general practice at Catisfield, Fareham, but was recalled to the Admiralty at the outbreak of war in 1914 and remained there until 1918. He was in receipt of a Greenwich Hospital pension. Surgeon Captain Biden had been a member of the British Medical Association for thirty-nine years; he was a member of the Council from 1906 to 1909, and honorary secretary of the Section of Navy, Army, and Ambulance at the Leicester Meeting of the Association in 1905, and vice-president of that Section at Sheffield in 1908. He leaves a widow.

The *Journal of the American Medical Association*, announcing the retirement of Dr. George Walter McCoy after forty years in the United States Public Health Service, pays tribute to Dr. McCoy's contributions to the investigation of tropical diseases, his enlightened administration of the Hygienic Laboratory, and his services to the Council on Pharmacy and Chemistry of the A.M.A. from 1915 onward.

Medical Notes in Parliament

Medicines and the Purchase Tax

During his speech on the Purchase Tax on drugs and medicines in the House of Commons on August 13, which was briefly reported in last week's issue, Sir KINGSLEY WOOD said that at present the medicine stamp duty was chargeable on certain medicines when sold by grocers or general retail stores, but not on those medicines if sold by chemists. To adopt the various amendments which had been put down would be to impose the Purchase Tax on those medicines when sold by chemists but not when sold by grocers or others. They must face the situation as it was, but he would make an earnest effort, if he could get the support of both sides, to get a reasonable solution, because the present position was impossible. He had exempted exceptionally costly surgical and medical appliances; what he had in mind was that those medicines which were already very costly ought not to enter into the mind of the medical practitioner when he was giving them to his patient. It was true that he was asking that, with these exclusions, a duty of 15½% should be placed on drugs and medicines, manufactured or prepared as specified in the third schedule of the Finance Bill. The Chief Medical Officer of the Ministry of Health, in his annual report for 1935, almost invited the taxation of medicines, even of the sort prescribed by doctors. He thought the proper thing to do was to protect those kinds of medicines, drugs, or appliances which were necessary, but at the same time it was right that a contribution should be made from the general class of medicines.

Dr. MORGAN urged that the Purchase Tax would be a serious matter for many poor persons and many institutions which had to cater for the poor. If there was one thing in any fiscal system which should be exempt from taxation it was drugs of any kind, whether chemical, organic, or vaccine. Captain ELLISTON said that any increase in the cost of drugs and appliances might mean delay in seeking early treatment, or at best inflict serious expense on a patient when he could least afford it.

Sir KINGSLEY WOOD stated that bandages would be exempt, and he had already accepted an amendment dealing with surgical appliances.

NO EXEMPTION FOR VOLUNTARY HOSPITALS

When the Finance Bill was considered on Report on August 15 Mr. STOREY moved a new clause to exempt voluntary hospitals from the Purchase Tax. This proposed that goods purchased on the order and for the use of a voluntary hospital which provided medical or surgical treatment for in-patients should not be chargeable goods. He proposed that the concession should not apply to institutions carried on for profit or to those maintained wholly or mainly at the expense of the rates. He said it was not in the national interest that there should be a decrease in the number of hospitals or a diminution of their services to the public. The exemption he proposed would cost £400,000 or £500,000 a year, or about 7% of the voluntary hospitals' total expenditure upon purchases. Captain ELLISTON supported the proposed new clause. Mr. SILKIN and Mr. DAVID ADAMS held that the concession should also be given to municipal hospitals, to which Mr. Adams said voluntary hospitals throughout the country were in the main inferior. Sir KINGSLEY WOOD said it was self-evident that a concession should not be given to voluntary hospitals only. He was unable to accept the new clause. He felt that the tax would play no part in the ultimate fate of the voluntary hospitals, one way or the other.

The proposed clause was negatived.

On the Seventh Schedule (Purchase Tax—(Chargeable Goods)) Sir KINGSLEY WOOD moved to leave out "medical and surgical appliances." He said this was to exempt a number of surgical and medical appliances not originally exempt, such as artificial limbs and spinal jackets, surgical boots, crutches, trusses, aids to the deaf, and other medical and surgical appliances which might have been held liable to tax. Medical and surgical instruments used by dentists were not taxed. By this amendment medical appliances, including operating tables, surgical bandages, and similar goods made up for surgical use, would also not be taxed. The effect of the amendment would be to exclude all such things.

The House agreed with the amendment, as also with another moved by Sir Kingsley Wood which was consequential. The result is that the Purchase Tax at the reduced rate is to be chargeable on "drugs and medicines, manufactured or prepared, except as specified in the third column," and that no tax will be chargeable on "essential drugs of an exceptionally costly character (including insulin, liver extract, and active principles of liver)."

On the motion for the Third Reading of the Bill Admiral BEAMISH hoped Sir Kingsley Wood would carry out his promise to look into the taxation of patent medicines. The taking of patent medicines was an extreme form of self-indulgence, and deserved to be taxed.

Sir KINGSLEY WOOD hoped to bring the Purchase Tax into operation at the beginning of October.

The Bill was read a third time.

Tuberculin Testing in Cattle

During the debate in the House of Lords on the second reading of the Agriculture (Miscellaneous War Provisions) (No. 2) Bill on August 13 Lord MOYNE referred to the new tuberculin. The trouble, he said, had been by no means limited to this country or to the supply of tuberculin recently produced at Weybridge. The new tuberculin was undoubtedly more potent in producing a reaction than that which used to come from Camden Town or from the Department of Agriculture at Cambridge. This trouble existed in a similar form even before Weybridge took over. The trouble was due to the fact that in tuberculosis, as in a great many other diseases due to micro-organisms, there were various strains. The bovine strain was not distinguished by the test from the avian strain, which was quite harmless to cattle. Many cattle had had avian tuberculosis which they had caught from poultry, and there were found post mortem tiny lesions the size of a pin's head, of no kind of importance from the point of view of the health of the cattle. Hitherto the test had not distinguished between the objectionable bovine infection and the harmless infection, but in future it was proposed to have, at the expense of the scheme, a simultaneous intradermal injection of bovine and avian reagents, and to compare the effects. If there was a much bigger reaction from the bovine, it would be accepted that the animal was a reactor to bovine tuberculosis. If, however, the avian outstripped the bovine in the size of the intradermal reaction, the animal would be passed as safe.

Mobile Surgical Units

Mr. MALCOLM MACDONALD told Sir Francis Fremantle on August 15 that the number of mobile surgical units equipped in the Emergency Medical Service and ready for action was 456, including seven special units. Of this total 115 were in the London sectors and the remainder distributed over the principal towns in each region. A team consisted of a surgeon, an anaesthetist, a sister, and a male assistant who might be either an orderly or a medical student. The teams would move under the orders of the Hospital Officer or the Group Officer in the respective areas. At the time of the evacuation from Dunkirk many of these mobile surgical teams did valuable work.

Visors and Chest Armour

Sir Francis Fremantle presided at a meeting on August 15, when Sir Richard Cruise and Mr. Kenneth Walker spoke on the prevention of war injuries by protective devices. Sir Richard described the visor he had submitted to the War Office in 1917. An improved type, superior in mechanism and efficiency, had now been perfected, and supplies had been ordered by the War Office for extended trial. A first order for these visors had been placed by the Admiralty. Sir Richard claimed that this device would prevent a majority of the eye injuries due to small fragments of high-explosive

shells and bombs. Mr. Kenneth Walker dealt with the prevention of chest wounds, which caused probably 60% of war casualties. He said materials were already available which could be moulded for attachment to the box respirator to form a protective shield for the chest cavity. A joint Committee of the Royal Society of Medicine and of the Service Departments was considering suggestions. The meeting appointed Sir Francis Fremantle, Sir Ian Fraser, Sir Ernest Makins, and Captain G. S. Elliston as a deputation to the Secretary of State for War.

Re-employment of Retired R.A.M.C. Officers

Sir ERNEST GRAHAM-LITTLE drew attention on August 15 to an anomaly in pay between retired officers of the R.A.M.C. who were employed before the outbreak of war under the Royal Warrant of Pay, 1931, Article 520A (or 1940, Article 498A) and those taken into employment after mobilization in September, 1939. Sir EDWARD GRIGG said it had been the practice since the war began to hold re-employed retired officers who were employed during peace to their peace conditions where the duties had remained unchanged. Where such officers had transferred to other duties involving a liability to serve at any station, or where the peacetime duties had changed to involve such an automatic liability, the officers had been transferred to full pay and allowances, their retired pay ceasing. In general the peacetime R.A.M.C. retired officers had continued to serve in their peacetime stations. A number had been restored to full pay on changing their stations and accepting general liability for service. Such restoration would be applied in any future case where general liability with forfeiture of peacetime contract rights was accepted.

Compensation for Byssinosis.—Sir JOHN ANDERSON, answering a question by Dr. Morgan on August 15 about workmen's compensation for byssinosis, or card-room workers' bronchitis, said proposals based on the Departmental Committee's recommendations had been substantially accepted by the employers' and workers' associations concerned. A Bill enabling effect to be given to them was being prepared and might be introduced soon after Parliament reassembled.

Payment for Unaccompanied Children in Scotland.—On August 20 Mr. ERNEST BROWN told Mr. Groves that payments in respect of the medical treatment of unaccompanied evacuated children were made by the Scottish Central Medical War Committee to Local Medical War Committees on January 30, May 8, and August 7, 1940. He had no information about when individual doctors received payments from the local committees. The payments were made to the Scottish Central Medical War Committee in accordance with arrangements made when the evacuation scheme was inaugurated. The Scottish Central Medical War Committee had these arrangements before them at meetings held on September 5 and December 15, 1939, and a report on the action taken was made at a meeting held on February 29 last.

Universities and Colleges

UNIVERSITY OF LONDON

The title of Professor of Physics, as applied to Medicine in the University of London, with the status and designation of Appointed Teacher, has been conferred on Dr. William Valentine Mayneord in respect of the post held by him at the Royal Cancer Hospital (Free).

R. Taby (*Thèse de Paris*, 1940, No. 53), who has collected nine illustrative cases, including those reported by W. F. Brayne (*British Medical Journal*, 1926, **1**, 17) and E. Farquhar Murray (ibid., 238), emphasizes the rarity of vaginal calculi. Their size is often enormous. They are composed most frequently of uric acid and oxalates, less frequently of carbonates. Urinary disturbance is constant in the form of incontinence, simple or complicated by cystitis, which is always due to a fistula. The calculi are either the result of passage of a vesical calculus into the vagina after perforation of the vesico-vaginal septum, which is the least frequent cause, or of their primary formation in the vagina.

Medical News

The United States Committee for the Care of Children has offered to provide hospitality for 100 doctors' children between the ages of 5 and 15, who would have to go unaccompanied by parents. The children will be looked after in homes selected by this committee in different parts of the U.S.A., and not necessarily in New York. Any doctor wishing to take advantage of this generous offer for his own children should communicate with the Secretary, B.M.A. House, Tavistock Square, London, W.C.1.

The 1940 Clinical Congress of the American College of Surgeons will be held in Chicago from October 21 to 25. There will be presentations of the latest advances in diagnostic methods, surgical technique, operative procedure, and the after-care of the surgical patient. Clinics and demonstrations will be held in the afternoon of October 21 and the mornings and afternoons of each of the four succeeding days.

The Industrial Welfare Society (14, Hobart Place, S.W.1) held a five-days lecture course in Birmingham last week for welfare supervisors and other persons engaged in industry interested in personnel and welfare work. This repeated a course given in London last month, details of which will be found in the August issue of the society's journal, *Industrial Welfare and Personnel Management.*

The first number of the *Revista Clinica Española* appeared on July 1, 1940, and is published in Madrid under the direction of Prof. C. Jimenez Diaz. It promises to become one of the most important medical journals published in the Iberian Peninsula. The scholarship of its editor is illustrated in three articles, the first of which deals with emphysema, the second with von Gierke's disease, and the third with the aetiology of asthma in flour mills. Among other interesting articles may be mentioned an admirable review of the value of sulphonamides and kindred preparations in pneumonia, which includes a bibliography of 116 references; two fully documented descriptions of cases of pancreatic adenomata producing hypoglycaemia; and an admirable article on the early phenomena of cerebral tumours by S. Obrador, in which this observer pays tribute to experience gained in the clinic of Prof. Hugh Cairns. The production of this new journal is of a high standard, and particular tribute must be paid to the epitome of current literature, which embraces the main journals of Europe and America.

The *Jewish Chronicle* reports that Jewish doctors will in future be excluded from panel practice in Rumania.

Lord Luke, chairman of the London Hospitals Street Collections Central Committee, who now for five years have been responsible for the scheme for combining hospitals flag days in London, has already received many offers of help for Tuesday, October 8. Voluntary hospitals, particularly those receiving no Government grant, are having a hard struggle to carry on though expenses are cut down to a minimum compatible with the welfare of the patients. The price of practically every commodity necessary for the maintenance of a hospital and the operation of such wartime measures as, for instance, the Purchase Tax threaten further serious rises of costs in essentials. The headquarters of the committee are at 36, Kingsway, W.C.2.

Ten of the American Medical Association's leading physicians and five of the officers have been appointed a committee to co-ordinate the efforts of the medical profession in a national defence plan.

The Ministry of Health, which recently asked the Red Cross and St. John War Organization to select, staff, and equip houses in various parts of the country as convalescent homes for all ranks of the fighting Forces, to comprise 10,000 beds, has now requested the War Organization to establish another 10,000 beds in private houses or in other suitable buildings. The total of 20,000 beds so set up will not necessarily be for convalescents, but may be used wholly or in part as auxiliary hospital beds, according to local requirements.

Canada's first hospital railway car, brought to Ottawa for inspection by medical, army, and railway officers, was recently approved. It will be a model for many similar cars to be provided as occasion arises. It accommodates eighteen patients and a staff of five.

Harvard University has recently conferred the honorary degree of doctor of science on Dr. Elliott P. Joslin, emeritus clinical professor of medicine and a pioneer in applying scientific knowledge to the treatment of diabetes; Dr. Alfred N. Richards, professor of pharmacology; and Dr. Thomas Barbour, director of the Harvard University Museum.

Dr. Jules Blumenthal, director of the bureau of child hygiene in the New York Department of Health, which he entered in 1905, will retire on September 1.

Dr. W. W. Stewart, professor of economics at Princeton University, has been elected chairman of the Rockefeller Foundation in succession to Mr. J. D. Rockefeller, jun., who has retired.

Dr. Max Askanazy, who holds the chair of morbid anatomy at Geneva, has been made an honorary doctor of the University.

The coloured lepers from Peel Island have been transferred to Fantome Island, which will be kept for coloured patients. Medical treatment will be given by four nuns.

The hereditary chief of the Chippewa Indians, John Big Wind, has died just before his 102nd birthday. He gave up smoking and drinking in 1905 and continued in robust health until recently, when his sight began to fail.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

Scarlet fever and enteric increased in incidence during the week. A glance at the table reveals that the majority of notifiable diseases for which comparative figures are available are now more prevalent than they were during the corresponding week of 1939. Cerebrospinal fever, enteric fever, and acute poliomyelitis are more rife, probably because of the abnormal circumstances prevailing.

Cerebrospinal Fever

This disease has been decreasing in prevalence with a few recurrences over the last three months, but is still present in forty-one of the administrative areas in England and Wales, but only in five were more than 10 cases recorded—namely, Lancaster 18 (Blackburn 2, Liverpool 7, Manchester 2, and 1 each in the county boroughs of Rochdale, Salford, Southport, in the municipal borough of Nelson, and in the urban districts of Chadderton, Huyton-with-Roby, and Litherland); London 14, distributed in nine boroughs; Yorks, West Riding, 14 (Bradford 3, Leeds 2, Rotherham 1, Sheffield 4, Pontefract M.B. 2, R.D.s of Goole and Hemsworth 1 each); Durham 13 (Durham 3, Sunderland 2, Darlington, South Shields, and West Hartlepool 1 each, and 1 each in five urban districts); Glamorgan 12 (Cardiff 4, Merthyr Tydfil 1, Aberdare U.D. 1, Barry M.B. 1, urban districts of Caerphilly, Penarth, and Rhondda 1 each, Neath R.D. 2). In Scotland the 29 cases notified were distributed amongst twelve counties and burghs, notably Glasgow 10, Edinburgh 3, and 3 each in the counties of Ayr and Fife.

Enteric Fever

The enteric fevers are less widely distributed, affecting twenty-seven of the administrative areas, but only in three were more than 10 cases recorded—namely, Devon 24 (Exeter 20, Teignmouth U.D. 1, St. Thomas R.D. 3); Northampton 14 (Northampton 1, Kettering M.B. 7, R.D. 2, Desborough U.D. 2, Corby and Rothwell U.D.s 1 each); Warwick 13 (Birmingham 8, Coventry 2, Kenilworth U.D. 2, Solihull U.D. 1). In Scotland 4 cases of typhoid fever were notified in Glasgow and 1 case of paratyphoid B fever each in the counties of Aberdeen, Fife, and Perth, and in the burghs of Aberdeen, Dundee, and Glasgow.

No. 31

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended August 3, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940 (a)	(b)	(c)	(d)	(e)	1939 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	142	14	29	1	5	21	4	12	—	—
Deaths		3	2				—	—		
Diphtheria	814	28	275	24	24	775	82	133	46	22
Deaths	13	—	11	1	—	14	1	5	1	2
Dysentery	42	2	54		—	41	7	27		—
Deaths			—	—	—			2	—	—
Encephalitis lethargica, acute	2	—	—		—	—	—	4		—
Deaths		—	—				2	1		
Enteric (typhoid and paratyphoid) fever	119	3	10	7	5	24	—	6	7	2
Deaths	1	—	1	—	—	—	—	—	1	—
Erysipelas		13	33	2	1		21	69	5	4
Deaths		—	1				1	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	29	7	10	10	4	21	3	16	4	3
Measles*	9,312	39	647		11		34	40		1
Deaths	6	—	8	1	—	5	—	1	1	—
Ophthalmia neonatorum	85	4	23		—	100	8	30		—
Deaths										
Pneumonia, influenzal†	425	17	4	2	3	398	20	1	2	3
Deaths (from influenza)	11	—	2	1	—	6	—	—	—	—
Pneumonia, primary			107	8				108	8	
Deaths‡		15		4	7		6		6	6
Polio-encephalitis, acute	8	—				4	—			
Deaths		—					—			
Poliomyelitis, acute	25	1	2	—	—	16	6	—	2	—
Deaths		—	—				—	—		
Puerperal fever	2	2	10	—	—	2	2	18	3	—
Deaths		—					1§			
Puerperal pyrexia	144	13	9		—	176	10	24		1
Deaths										
Relapsing fever	1	—			—	—	—			—
Deaths										
Scarlet fever	1,502	42	144	39	43	1,508	152	189	55	73
Deaths	3	—	—	1	—	2	—	—	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	818	5	41		13		192	42		—
Deaths	2	—	1	4	2	6	3	2	1	—
Deaths (0-1 year)	282	37	53	26	29	209	28	54	12	15
Infant mortality rate (per 1,000 live births)						33	25			
Deaths (excluding still-births)	4,039	635	583	168	134	3,645	648	535	124	109
Annual death rate (per 1,000 persons living)			11.8	11.2	11.7	8.9	8.3	10.8	8.3	9.6
Live births	5,811	936	807	373	221	5,128	960	904	404	224
Annual rate per 1,000 persons living			16.3	24.9	19.4	16.0	12.3	18.3	27.2	19.7
Stillbirths	248	32	33			214	30	42		
Rate per 1,000 total births (including stillborn)			39			34	25	44		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

Sulphonamides in Infantile Enteritis

Dr. L. M. M. BEADNELL (Brighton) writes: I should be interested to know if the sulphonamide group of drugs has ever been tried in cases of infantile enteritis. Some of these babies, even after the dehydration and acute symptoms have been arrested by diet, drugs, and intravenous salines, succumb for no apparent reason, presumably from the profound toxaemia caused by the organisms. Sulphapyridine in particular is effective against so many diverse organisms that it seems possible it might be effective in these cases if used early enough. I should be grateful for the experiences of your readers.

Hairy Legs in a Girl

Dr. R. COTTER (Liverpool) writes in answer to "Civic" (August 10, p. 212): If the growth on the patient's legs is of recent development "Civic" should exclude the possibility of pregnancy; for the significance of this sign, nowadays apparently little understood, was clearly recognized and described by the old clinicians. For spontaneous growth of hair on the legs *x*-ray therapy is claimed to be specific.

"Only Functional"

Dr. M. W. BROWDY (London, W.1) writes: The distressing symptoms described by your correspondent (August 17, p. 244) are quite common in the neuroses (anxiety) and are due to an overdose of adrenaline. The cause is most likely psychological (anxiety, fear), conscious or unconscious, and search should be made for this and eradicated. The symptoms are relieved by luminal grain 1/2 at night, or grain 1/4 twice or thrice daily. In my experience it is inadvisable to prohibit the harmless customary habits of the patient in order to avoid a conditioned reflex: the fixing of the somatic symptoms in the patient's mind by recalling the prohibition—a vicious cycle.

Income Tax

Allowance for Depreciation by Wear and Tear of Electrical Equipment

Three or four years ago a representative of the British Medical Association came to an agreement with the Inland Revenue official concerned that 7½% on the written-down value of the equipment could be accepted as a reasonable allowance for income tax purposes—increased as that allowance now is by a further one-fifth, making 9% in all. Doubts have recently been thrown on the adequacy of that rate for such apparatus as an electrocardiograph, for instance. In the first place it has to be realized that while the authorities are willing to classify items of plant into groups for this purpose, they are not prepared to deal with individual items; the problem of modern industrial plants would be insoluble on such a basis. What is important, therefore, is to agree an "omnibus" rate which will be fair in the average case. It is true that if and when any item of the equipment is replaced the "obsolescence allowance," so to speak, steps in, but if replacement does not occur—and that is apt to happen in connexion with retirements—that redress is not forthcoming. The main factor to consider in estimating a rate of depreciation is the life of the item *as a unit*. The longer it can be kept going by repairs and replacement of its parts (both allowable as current expenses) the lower the appropriate rate of depreciation. In the case of items of plant or equipment which are of delicate construction as contrasted with solid build, constant use affects the life more quickly—that is, the time at which complete replacement is preferred to further repair is brought nearer. On the other hand, the normal factor which affects the life of machinery is constant vibration set up by a number of rapidly moving parts, a factor which plays a comparatively unimportant part in medical equipment. A factor which is of importance to the practitioner is the supersession of the apparatus by some improvement resulting from new invention: but that is not to be taken into account, as the income tax allowance is for depreciation by reason of wear and tear only. On the whole we agree that there may be grounds for doubting whether the present basic rate of 7½% is sufficient, apart from the adjustment which comes automatically when renewal takes place. If, however, it is to be attacked it can only be on the grounds that it is insufficient for medical electrical apparatus as a whole, and evidence would be necessary to demonstrate what is the average working life, as affected by wear and tear only, of such apparatus. We are doubtful whether such evidence is obtainable.

LETTERS, NOTES, ETC.

Ingrowing Toenail

Dr. GEORGE PRENTICE (Port Jameson, Northern Rhodesia) writes: In the treatment of ingrowing toenails there is a simple and efficacious method. By removing a wedge-shaped portion of the nail from the middle in front until the apex of the wedge impinges upon the quick a triangular space is left, base in front and apex behind. The two portions of the nail thus separated (the nail should be allowed to grow long) work inwards to meet each other and fill in the gap, and the edges that have given trouble by ingrowing are gradually drawn up till they ride free of the tissues they were damaging. The patient, if shown how to do it, can repeat the process until all is well. It takes time but is effective.

Adrenaline Injection for Allergy

Mr. J. BERNSTIEN, F.R.C.S.Ed. (Liverpool), writes: For some considerable time past I have been using the following preparation in cases of chronic allergic disturbances, and also in cases of severe allergic conditions: adrenaline alkaloid 1 mg. or 2 mg., chlorbutol 15 mg., glycerin 1 c.cm. The preparation is injected either intramuscularly or subcutaneously (the former preferred) and will give prolonged relief and, in many cases, better results than the preparation of adrenaline in oil. There is a certain degree of pain, but this is not intolerable and the patients do not appear to mind. This preparation has been put up in 1 c.cm. ampoules of both strengths by Evans Sons Lescher and Webb.

Ionization with Prontosil

Dr. JAMES STEWART (Lancaster) writes: I have just found out that the solution of prontosil ordered for and used in the experiments in ionization (*Journal*, July 6, p. 29) was made up from ampoules of prontosil soluble. As the solution was red it did not occur to me to question the nomenclature. I have written to those who wrote to me direct, but hasten to apologize to any who may have tried to make a solution from tablets of prontosil rubrum.

Back Numbers of the "B.M.J."

Dr. G. L. BUCKLEY (Bournemouth) writes: I have already had four applications for the back numbers of the *British Medical Journal* about which I wrote in your issue of August 3 (p. 178). Possibly some other B.M.A. members turning out their cupboards may be able to supply the needs of the unsuccessful applicants. The writers express a great desire to have the *Journals* for purposes of reference and research.

Correction

We regret that through a misprint in our News column of August 10 (p. 211) the address of the Editor of the *Medical Directory* was incorrectly given. It is 104, Gloucester Place, Portman Square, London, W.1.